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A DECADE OF DECISION

By FRED HOYLE

The author is no longer solely concerned, with astronomy, as in the days of his unforgettable broadcasts, and his best-selling *The Nature of the Universe.* In this challenging new book, with its alarming warning about the prospect before the world, he bestrides all the sciences.

He considers the problems of this atomic age, the chances of survival of our nation, and the wider issue of the chances of survival of our whole present-day civilisation.

If the world saves itself from atomic destruction, will we be able to keep its expanding populations? Are we to continue to allow overcrowding in the world with the inevitable self-restoring balance only brought about by famine, disease and war? Or can we think with a sufficiently international mind of an intelligent humane control of atomic power, of maximum food production, of discouragement of overpopulation, so that we may be the first civilisation to foresee and prevent its own destruction?

Mr. Hoyle considers all these problems in this forth-right book, and presents a solution to mankind in general, and the population of these islands in particular.

A DECADE OF DECISION

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A
DECADE OF DECISION

by

FRED HOYLE

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TO THOSE WHO ARE DETERMINED
THAT BRITAIN SHALL NOT DECLINE
INTO APATHETIC DEPENDENCY

CONTENTS

PAGE

PREFACE ix

I. AN OUNCE OF CHEESE 1

II. A MODEST PROPOSAL 25

III. BEDROCK 76

IV. THE RISE OF HUMANITY 111

PREFACE

THERE comes a time in life when a man feels under an obligation to the country that reared him, and to the people that he grew up amongst. It may seem strange that this should have led to the writing of a book that seeks to emphasise our economic and physical insecurity. But in recent years I have come to feel more and more urgently that public commentators are not bringing this insecurity home to us with sufficient vividness; of our being tied to a wasting economy; of what the fate of this tightly packed island in an atomic war would very likely be; of the menace of the world's rapidly rising population; and of the threat of an ultimately disastrous decline in world-wide resources.

If our fate were certain there might be some point in keeping these matters hidden. But disaster is by no means inevitable. *It is perfectly possible to counter the threat of atomic weapons,* for instance, by dispersing a considerable proportion of our population to the Dominions. Whether we ought in fact to adopt such a measure is not for me, or for any other person, or for any limited group of persons, to decide. *In a matter of such great moment, it is the will of the whole British people* that ought to be decisive. But—and here is the crucial point—the people cannot offer a considered opinion until they become sharply aware of the facts on which such an opinion should be based.

This will explain why I have discussed so forcefully those matters that, as a scientist, I feel myself in a position to appreciate. It may be that too strident a picture has sometimes been painted, and that distortions may have been introduced. This is apt to happen when, for the sake of conciseness, one is striving to represent a big subject on a small canvas.

Nowadays scientists find themselves between two fires. When they keep silent on social and political matters, they are accused of being indifferent to the abuse of their discoveries. When they speak out, they are usually told that their views are too 'calculated', or that they are too 'naïve', or that they are guilty of 'oversimplifying' difficult problems (by implication, all problems in science being easy). I suspect that what I have written will very likely provoke these latter responses from the experts. This has not dissuaded me, however, mainly for the reason already explained, but partly also because the successes that have so far been achieved by the people who claim to understand the subtlety of human problems have not been impressive. This being so, I do not think that the non-expert need be unduly bashful about putting forward a new outlook on human affairs.

F. H.

Cambridge,
November, 1952.

A DECADE OF DECISION

CHAPTER I

An Ounce of Cheese

> 'He could not forbear taking me in his right-hand and, stroking me gently with the other, after a hearty fit of laughing, asked me whether I were a Whig or a Tory.'

Election Tactics

'In recent elections in London, canvassers for the Labour Party were said to have carried around with them the weekly one-ounce cheese ration. According to Conservative statements the mere showing of the cheese to electors had a notable effect on the outcome of the election.'

Curious as it seems, several of the ingredients that go to make up the relationship between the British electorate and their Government can be discovered in this little incident. To bring out details, let us see how Labour's cheese policy stands up to the touch of logic. It is true that the one-ounce ration can be said to establish that the present Conservative Government has not provided us with the quantity and quality of food that we think we ought to have, but since Conservatives freely admit this, the ocular demonstration of the cheese ration was not in itself a relevant argument; to become meaningful the cheese policy required backing up by a further consideration, namely that Labour would have managed things better. No serious attempt was made to establish this proposition, for the very good reason that less than a year earlier a Labour Government had itself chipped the meat ration down to a meagre eightpence-worth per week. From this only the smallest of steps is required to see that the whole cheese affair was simply a case of Tory kettles being called black by Labour pots and pans.

All this might appear absurdly trivial, and so far as the outer trappings of the matter are concerned it undoubtedly is, but deeper questions appear as soon as we look for the reasons underlying it. In the first place, it seems inconceivable that the organisers of the Labour election campaign, whom I take to be pretty astute fellows, were unaware of the logical weakness of their case. Why then did they decide to use the one-ounce tactic? Possibly the reader may find a more charitable explanation, but the only adequate explanation I can give is that the Labour election agents regarded any argument as good so long as they thought it might win votes. If indeed the cheese policy was decided on in this light, it is evident that Labour agents can hold only a very low opinion of the intelligence of the electorate. One cannot help feeling that a householder of choleric disposition, on being shown the fateful one-ounce, might well have reacted to the implied stricture on his mental capacity—that he was incapable of recalling Labour's eightpenny meat ration--by ramming the cheese down the canvasser's throat, thereby setting the latter a week behind in his work.

The disposition to regard the electorate as made up of feather-brained individuals seems to be fairly general in political circles; this is at once apparent in much of the material printed in the daily press. It was also apparent in Conservative statements made after the results of the cheese-ration election were known. Thus the Conservatives attributed Labour successes to the cheese tactic, and by implication voters were upbraided for being taken in by so transparent a device.

Now it is scarcely surprising that our politicians should take up this sort of attitude. An election seems an important affair to them simply because each side sets a considerable store on winning it. When it sometimes turns out that voters do not judge the matter with equal seriousness, and that trivialities affect the outcome, the candidates tend to develop a contempt for the general intelligence of the people. This is a subjective point of view, however. Weighty issues cannot decide an election unless there are weighty distinctions between the participants. Or to put it the other way round, an election will usually turn on inconsequential matters if the candidates themselves *have only trivial differences. The recent elections* in question should be so interpreted. Thus, to give a personal view, it seems to me quite proper that the display of cheese should have affected the results, since it has become increasingly evident in recent years that the differences between our two main contending parties are so small as to be suitably symbolised in this way.

To push the argument to a more serious level, we shall be concerned in this chapter with the proposition just enunciated: that, when measured in terms of effective action, a Labour Government differs but little from a Conservative one.

Tweedledum and Tweedledee

But surely, it may be said, there is plenty of evidence to show that what the Labour Party did between 1945 and 1951 was very different from what the Conservatives would have done. Can we not bring forward as evidence full employment, the establishment of the Welfare State, higher pay for wage-earners, and the nationalisation policy? At first sight these seem to be telling points, but on a closer examination I think it will be realised that this is not so; that even on those matters where the greatest differences are claimed there is really very little to choose between the two parties. Let us deal with the several issues just mentioned in turn.

So consider full employment first. Great Britain is not a self-sufficient country. A very large importation—foodstuffs, raw materials, . . .—is constantly required to keep us going. Although this importation ought to be paid for by our visible exports, it is more than a hundred years since this was the rule and not the exception. Formerly the gap was filled by invisible exports,* partly by the interest received on foreign capital investments and by the spending of the capital itself. This latter is no longer an effective expedient, however, since by now most of the capital has gone, as it was inevitable that it would eventually go. Now, we are faced by the apparently never-ending balance-of-payments crisis.

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*Invisible exports: Shipping charges, Insurance, Banking. . . .

It is an elementary inference that to cure the payments crisis we can reduce the level of our imports, increase our exports, or do both. The level of imports has already been pared down as far as is thought desirable by either the L.P. or the C.P.: a further appreciable reduction would show itself in a general lowering of our standard of life—consider, for example, the effect of a marked reduction in the importation of foodstuffs. The Government responsible for such a decline would evidently lose votes, which neither party has any wish to do. Accordingly, both parties favour the alternative of increasing exports, and since a maximum of exports is achieved when there is a maximum of work done, full employment in the productive trades is a natural corollary. Add to this the requirement that the people must not be able to buy too many of the goods they produce. This is taken care of by very heavy direct and indirect taxation, which again is a policy understood and practised by both parties.

There remains for discussion the important point, implicit in the above argument, that the goods we produce for export can in fact be exported. That is to say, full employment is dependent on there being other countries who wish to buy from us. Partly because two of our main industrial competitors, Germany and Japan, were largely out of action, and partly because the war had produced an accumulated demand for our goods, there was no real difficulty in our selling abroad all the goods we produced during the term of office of the late Labour Government. Consequently there is no difficulty in understanding how it was that Labour could maintain full employment. The Conservatives would have been able to do exactly the same had they instead been in power during this period. The Conservatives would have done the same, because the full employment of the years 1945–51 was a product of a world situation, not of the activities of a particular party.

By contrast, the great depression that started in the late nineteen-twenties produced unemployment because we could not then sell our goods abroad; and again this was a product of a world situation, not of the activities of a particular party. Thus it is irrelevant to compare post-war full employment under Labour with pre-war unemployment under the Conservatives. To establish that the L.P. is the party of full employment as compared with the C.P., which presumably on this argument is supposed to be the party of unemployment, it would be necessary for the L.P. to give us national prosperity at a time when there was a world-wide depression and with Germany and Japan as unconstrained competitors.

Turning now to the Welfare State, here I must admit to the loss of a trick, for I think it can correctly be claimed that the L.P. has pushed ahead with the organisation of the Welfare State at a faster rate that the C.P. would have done. It is true that the Welfare State is not an L.P. invention; it began with the earliest form of National Insurance. Nor was the further development of the Welfare State exclusively an affair of the L.P.: witness the Beveridge Plan, prepared under the auspices of the war-time Coalition Government. The Welfare State is not the prerogative of any one party; it has been in the air now for several decades. Still, one must admit the claim that the most energetic party in its furtherance has been the L.P. Indeed so rapid was the development during the years 1945–50 that in 1951 even official Labour opinion felt some retreat to be necessary. This retreat called forth strong protests from a minority section of the L.P., which, quite rightly, saw in the matter of charges for false teeth and spectacles one of the few real points of difference between the L.P. and the C.P.

The following figures* show that wages are now substantially higher in pounds, shillings and pence than in pre-war days:

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*Taken from *The Financial Times*, which also forms the source of other data given in both this and the next chapters.

YEAR	*1938*	*1946*	*1947*	*1948*	*1949*	*1950*
GROSS WAGES IN £ MILLIONS	1985	3197	3671	4140	4370	4611
GROSS SALARIES IN £ MILLIONS	1114	1815	1981	2238	2400	2552

The present issue is not the rise in wages—this is undoubted—but whether the rise was an outcome of the good offices of the L.P.; whether the rise would have been any less if the C.P. instead of the L.P. had been returned to power in 1945.

In the first place, rising wages have been of world-wide incidence, mainly through the fall in the value of money produced by the late war. The increase between 1938 and 1950, shown in the above table, is indeed just about what is required to cancel the fall in the value of the £ and the rise of direct taxation. Thus British workers, among whom the L.P. counts the majority of its supporters, have not improved their lot by anything like the margin that these wage figures might superficially suggest.

Not only this but, so far from encouraging these increases, successive Labour Chancellors from 1947 onwards were actually concerned to *prevent* the Trade Unions from demanding further wage increments. In this they were undoubtedly more successful than the C.P. could have been, since there is a long tradition of mistrust between the C.P. and the Trade Unions. Hence it is fair to conclude that if the C.P. had been in power in the years 1945–51 the Trade Unions would have been far more vociferous in their demands, and hence the rise of wages might well have been even greater than the rises shown above.

This is not the only way, or the most important way, in which the L.P. acted against the interests of the working class, however. When it was discovered that the level of wages and salaries was tending to undermine the financial stability of the country, Labour adopted an age-old correcting device: the £ was devalued. This is an interesting point deserving discussion.

Except possibly during a few rare and brief periods, people who are employed by others always make strenuous efforts to secure increases of payment for themselves. This steady demand by the employed leads to a steady trickle of concessions from the employers, and hence to a steady overall rise in the payments made. If in a particular community the resulting general increase were to lag behind an increase in productivity, the rise of wages would contain no serious threat to financial stability; but if, as is very often the case, the rise of wages runs ahead of productivity, some correcting device must sooner or later be set up. The correcting device lies to hand; for since wages—and effectively salaries also—are paid in cash, all that need be done is to reduce the purchasing power of the cash. This explains, of course, why, despite the enormous increase of world productivity during the last few centuries, inflation of currency has been the rule and deflation the exception.

We next relate these remarks to Labour's action in devaluing the £ from an equivalent of 4 U.S. dollars to 2·8 dollars. Great Britain, as we have seen, depends on a large export-import trade for its well-being. Raw materials are a main item of import: metallic ores, wool, cotton, timber, rubber, and, for the purposes of the present argument, food. Now although there is no strict mechanism whereby the world prices of raw materials are determined by their dollar prices, this is effectively so in practice.* Such must indeed be the case as a result of the workings of normal economic processes, since the U.S. is by far the world's largest trader in the raw materials in question. Hence a devaluation of the £ as compared with the dollar must produce a comparable increase in the amount of sterling that has to be paid for our imports. To protect ourselves against this rise there must be an increase in the sterling prices of our exports, which of course implies a fall in the real value of the £.

To bring the matter into clearer relief, it should be noticed that the sterling prices of our exports need not rise by as large a proportion as the rise in the cost of raw materials. This follows because most of our exports, being manufactures, bear a price that is only partly determined by the cost of raw materials. Manufacturing costs do not rise proportionately since devaluation does not affect labour charges—at any rate not immediately after devaluation has taken place. We see therefore why devaluation enabled us to market our goods at a lower dollar price: raw materials keep pace with the dollar, but manufactures do not, since labour charges do not. This was the object of the whole procedure, to make our exports cheaper for other countries to buy by depressing the real value of wages and salaries at home. The same thing could have been done without devaluation by a widespread reduction of wages and salaries in their sterling equivalents, but as people would not have tolerated this, the hole-in-the-corner method of devaluation was used instead; presumably on the basis that what a man could see if his wage was slashed directly by some 30% or so, he could not see if the £ was devalued from 4 to 2·8 dollars. It is to be emphasised that no suggestion is being made that the L.P. took any joy in thus reducing the standard of living of the people; if they could have avoided it no doubt they would have done so. My point is that the L.P. acted in accordance with necessity, even when necessity demanded action against its own supporters; for on the whole devaluation told more against supporters of the L.P. than it did against supporters of the C.P. Thus it was possible for a man with free capital to protect himself against devaluation; for example by investing his capital in companies whose business lies in the production of raw materials. Not all people with capital protected themselves in this way, but many of them did, and I think it could be established that they were mainly supporters of the C.P., not the L.P.

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*Dollar prices of raw materials are, of course, subject to the usual relation of supply and demand.

This shows how, in the stress of economic necessity, a Government can act against those whose interests it claims to have at heart. Many other examples could be given showing the same thing, but to spare further trivialities only one other case will be mentioned.

It is well known that voting in the rural constituencies is heavily in favour of the C.P.; farmers are overwhelmingly Conservative in their sympathies. Yet if there is one group that may be said to have flourished more than any other under Labour rule, it is that of the Conservative farmers! A Socialist might claim this to be an example of the broadmindedness of the L.P., but it would be more accurate to describe it as a reflection of the country's dire need for food. What a Government does in actuality is very largely determined by the economic climate in which it has to work and bears little relation to its political claims.

Lastly we come to the question of nationalisation. Surely, it will be said, here is a matter over which there have been substantial differences. If not, what was all the fuss about? Well, what the fuss was about I cannot say, but I do suspect that the difference between the political parties over nationalisation has been comparatively trifling; trifling compared with the issues that lie at the root of Britain's long-continued economic crisis. To face the matter squarely, let us consider the most hotly debated measure of all, the nationalisation of iron and steel. Firstly, what did Labour achieve by its Iron and Steel Nationalisation Bill? Certainly not the direct management of iron and steel production, for all the political parties lumped together do not possess enough technological competence amongst them to run an enterprise as complicated as the iron and steel industry. The L.P. was therefore obliged to leave iron and steel under essentially the same direct control as before. That is to say, the detailed management of the industry was in the main left in the hands of the very people who managed it in the days of private enterprise, and it could not have been arranged otherwise: not unless a large section of the Parliamentary Labour Party had settled down to twenty years' hard study of the technology of iron and steel.

Then again, it might be said that the L.P. achieved an indirect control over iron and steel through acquiring the power to lay down the broad features of the industry's policy; but such an indirect control was exercised during the war by the Coalition Government without nationalisation; indeed any Government that knew what it was about could have acquired indirect control without nationalisation, since a Government can control the economic conditions in which industry must operate. So what did Labour's nationalisation really amount to? To an alteration in the status of the iron and steel shareholders and nothing more. Instead of the shareholders being paid a dividend that fluctuated with the prosperity of the industry, they were offered Government bonds at a fixed, guaranteed rate of interest. 'Ah,' it may be said, 'there's the rub; after nationalisation the shareholders no longer controlled the industry, whereas before it they did.' The last part of this statement is incorrect, however. Shareholders in a large industry do not in fact control policy; that is in practice decided by managements and by boards of directors; it is as absurd to imagine that shareholders control industry as to suppose that British foreign policy is determined by Government bondholders.

Now we are at the root of matters. Iron and steel nationalisation amounted to nothing more than an enforced business deal between the Labour Government and the shareholders. As in most business matters, there were disagreements between the two participants on the terms of the deal. Shareholders claimed that they were swindled, and this is probably correct, since a deal is not likely to be carried out equitably when one of the participants has the power both to enforce it and to decide on the terms under which it must be executed.

A Paradox Resolved

How is it, we may now ask, that two political parties,* expressing such different opinions and having such different philosophical traditions, come to behave so similarly when they are faced with the job of actually running the affairs of the nation? Can it be that their continual verbal disagreement is deliberately put on to deceive the people? This, emphatically, I do not believe to be the case. I believe that politicians are usually quite sincere in their statements, more so than is generally believed. The trouble with our political parties has not been so much a lack of sincerity as a lack of understanding.

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*Perhaps some mention should here be made of the Liberal Party. In its policy, the Liberal Party has attempted to find a path lying somewhere between the L.P. and C.P. By doing this Liberals have effectively destroyed themselves. For, as we have seen, the actions of the two

Thus I think there is no doubt that the L.P. in 1945 genuinely believed the policy of nationalisation to be the Philosopher's Stone, the touch of which would soon restore Britain to economic health. After all, was not the L.P. imbued with a socialistic doctrine requiring that insufficiencies arise from the machinations of the wicked capitalists? Surely, by sitting heavily on the wretches who restrict production deliberately in order to promote scarcity, everything could be put to rights at a moment's notice? How well things were put right was shown by the events that followed Labour's victory at the election of 1945. It was soon discovered that there could be an economic blizzard even when the capitalists had been muzzled. By 1947 it was at last realised, in a section of the L.P., that the socialist theory of the previous fifty years provided no solution to the immediate problems with which they were faced. Then followed what would, if it were not of deadly serious moment to us all, be almost suitable material for a comic opera. We find a Labour Government exhorting workers to more strenuous efforts. But had not the Trade Unions always maintained that their members worked too hard? Was it not the Trade Unions who first decreed that a man should not work at more than a specified maximum rate, a rate that was fixed so as to be far inside the compass of the average worker? We find a Labour Government persuading

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main parties are really convergent, not divergent; so that the Liberal Party has been squeezed practically into nothingness by the convergence of the flanking parties.

the Trade Unions not to press for higher wages. But is it not traditional Trade Union policy to press for higher and higher wages to be paid for less and less work?

In view of these and other contradictions it was not surprising that Labour no longer continued to speak with one voice. To placate those who had suffered the strongest indoctrination of Socialism, the nationalisation programme had to be pushed through to the bitter end. Hence the iron and steel farce. Even today it would seem that a group within the Labour Party has to a considerable extent preserved its faith in the efficacy of the incantation of nationalisation.

It was the same story in foreign affairs. In 1945 the L.P. asserted that what was needed in order to get along with the Soviet Union was a British Government that understood the Russian point of view, meaning of course themselves. A short time after the L.P. had been returned to office, those who had the job of dealing with them were maintaining the impossibility of anybody getting along with the Russians. This too was a point of view that only penetrated slowly through the L.P. as a whole. At first many Labour Members were incredulous at being told that the Soviet Union was not the socialistic nation they had always imagined it to be, but an imperialistic one. It is interesting to notice that it was mainly the same individuals in the L.P. who found it difficult to appreciate this as those who found it difficult to understand the economic irrelevance of the nationalisation policy. Their bewilderment was that of a man who dresses himself in flannels, white shirt, and straw boater expecting a nice warm day at Brighton, only to find himself suddenly transported into a storm somewhere on the Antarctic plateau.

The C.P. cannot perhaps be given quite the same high marks for the sincerity of their protestations. It is indeed difficult to suppose that anyone could be naïve enough to believe sincerely some of the implications of Tory propaganda: that nationalisation and the rapid development of the Welfare State was the direct cause of repeated economic crises, or that 'bulk buying' was the cause of the continued shortage of foodstuffs, to mention only two such absurd imputations. Still, I think that the C.P. was completely sincere in one belief—that they could manage things better than the L.P. How this was to be done was not made clear, but I think it was a belief that was genuinely held. It was as if two men in a buggy were being pulled by a runaway horse; when one of them has tried vainly to hold the horse, the other is certain to think that, given an opportunity, he could do better.

There is a current in the affairs of men and this current is nowadays fast-moving and turbulent. Anyone who seeks to navigate on it must know exactly what he is about, otherwise his craft will soon be out of control and forced to race along with the stream. Now, whatever else may be doubtful about the propositions set forward in this book, of one thing I feel confident: that none of our political parties has any understanding of what is required for accurate navigation on this great river of civilisation. In 1945 the L.P. gaily took over the ship in which we are all embarked, believing that Socialism was a pilot's chart. Within but a year it was discovered that nationalisation and the other recipes of Socialism, if indeed they can be considered as a pilot's chart at all, certainly do not refer to the part of the river in which we are moving at the present time. The shock of this discovery left the L.P. in a state of helplessness, and the current soon had our craft within its grip; all the L.P. could then do was to prevent foundering on the nearest and most obvious rocks. It was to achieve this minimum of control that the feverish, contradictory measures referred to above were taken.

Any Socialist who has borne with me thus far will probably feel, in spite of protestations to the contrary, that I must be a member of the Conservative camp. My attacks on the L.P. have been more frequent and sustained than my strictures on the C.P. I can assure Socialists, however, that this is not in any way because I prefer the C.P. It is rather because the L.P. has made so many incorrect claims about the merits of the 'pilot's chart' of Socialism, and because these claims must be contradicted. The C.P., on the other hand, makes no such claims.

Indeed, Conservative tradition has always been, not to attempt navigation, but to drift with the stream as a matter of policy. This 'muddling-through', as it is usually called, stands condemned. Muddling-through may carry us down a few rapids in our river; but when the current is moving as swiftly as it now is, we may expect, not just rapids ahead, but a huge fall; and if once our bark gets carried over a great fall the policy of muddling will avail us little. This anticipates the arguments of the next two chapters, so for the moment I will say nothing more about what the future may hold in store for us. Instead I should like to mention one or two of the more obvious troubles that have arisen in the past through our traditional preference for muddle-headedness in politics.

Before doing so, however, I ought to clear up the paradox that has been implied in all our discussion so far: how is it that two parties with such different philosophies as the C.P. and the L.P. come to behave in essentially the same way when they have to carry out the actual process of government? The solution lies close to hand: what a party says it will do is what it would like to do; how for preference it would like to navigate itself through our stream. What a party in fact does is dictated, not by these wishes, but by the flow of the stream. We have seen how the L.P. lost control and became swept along by the current, and how the C.P. has, as a matter of policy, always allowed itself to be swept along by the current. It is the same current for both, and that is why their actions have been so nearly equivalent.

Muddling Through

There is a dangerous disposition in many people to pretend that weaknesses are virtues. Thus there are many Conservatives who claim to be proud of the muddle-headedness of their party. The main case that can be brought against this attitude is set out in the following two chapters. For the present we can be content with one or two examples to show the sort of mistakes that arise when policy is decided by befuddled thinking.

We have just discussed the shock received by the L.P. when it was discovered that Socialism was no passport to economic prosperity, and I mentioned how, in the state of mental disturbance so produced, a number of desperate measures were taken. One of these measures was the sale abroad of the Nene and Derwent jet engines. To effect such a sale, these engines had to be struck off the secret list. As soon as this was done the Russians ordered, and obtained, samples directly from the manufacturers. Then, using our engines as a base, the Russians produced a jet plane in large numbers. The resulting fighter has inflicted severe losses on U.N. forces in Korea. Not only that, but we have been forced into a rapid programme for improving fighter engines and this has cost us vastly more economically than was ever gained in the original sale.

One further remark on this subject. When a nation reaches such a condition—as was probably the case with the jet engine—that it begins to be argued that vital equipment should be exported as an economic necessity, this does not mean that the equipment should in fact be exported. It means that a surgical operation on the nation's economy is required. Postponement of the operation can only make the nation's condition worse, thereby increasing the gravity of the operation when ultimately it has to be performed.

The second example I want to consider is the so-called German problem. This is difficult to discuss without prejudice, and difficult to listen to without prejudice. The late war brought so much misery into the world that it is hardly surprising to find the German question still clouded with incoherent thought. Yet if we are to prevent a repetition of the catastrophe we must try to view its history in a clear perspective. First, then, I would like to say that the Germans suffered too from the war. It must be remembered that the volume of personal tragedy in Germany is very great indeed; probably only the Jewish people, the Russians, and possibly the Poles, have experienced more. An unthinking reaction would be to say 'Serve 'em right. They started the war, didn't they?' In one way of speaking Germany certainly started the war when Poland was invaded in 1939, but the crucial steps that led to this event were taken much earlier. Since we shall consider this matter later it will be sufficient for the present to say that the first people to fight Hitler were Germans. They fought Hitler and his followers in a bitter struggle that lasted for several years up to 1933, when they were finally suppressed in the most brutal possible manner.

In these critical years the British, French, Russians, and the Americans all had the opportunity to support Hitler's opponents. Only a little aid to them, a very little, would probably have turned the scale. But the Western Powers referred to them as 'communist riff-raff' and did nothing. Whether they were communists or not I do not know—indeed I do not know exactly what 'communist' means in this context, but at all events the Russians also did nothing effective to help them. In the outcome, Britain and France only began to waken up to the Hitler menace in 1938; and it took the Americans and Russians until 1941 to take effective action against the self-same system that the 'riff-raff' had fought before 1931.

These remarks should not be interpreted as an attempt to whitewash the Germans. What I am saying is simply that the Germans are not all black, and of course they are not all white; they are like other people. If on occasions Germans act in a manner that we consider strange, it is not because of some special biological peculiarity, but because their experience has been unusual. This, then, is the spirit in which I want to approach 'the German problem'. I should like to be able to present matters from both sides, as it were, but not being a German I cannot do this. Instead I propose, first, to look at the situation as a frankly imperialistic Englishman, and second, to examine the matter from what I hope my German friends will consider a reasonably neutral position.

Firstly then, as an imperialist, I take notice of the following facts: In 1850 Great Britain was economically and militarily stronger than Germany. Germany's performance in the first world war, on the other hand, when she took on Great Britain, France, Russia, and the U.S. practically single-handed, shows that by 1914 German strength was at least equal to our own. Why had successive British Governments allowed this change to happen? The answer would seem to lie in the traditional policy of allowing things to drift, of 'muddling-through'. The price of this muddling was paid for on the battlefields of Flanders. It was a heavy price in blood, but it ensured that Britain was militarily and economically stronger than Germany in 1918.

We have already mentioned the muddling of the nineteen-thirties; of how the British, French, Russian, and American Governments allowed German strength to once again become so great that eventually Hitler was in a position to challenge and fight Czechoslovakia, Poland, Britain, France, Holland, Belgium, Denmark, Norway, Yugoslavia, Greece, Hungary, Rumania, Bulgaria, the Soviet Union, Lithuania, Latvia, Esthonia, the British Dominions and Colonies, India, several South American republics, and the U.S.—to mention those nations that come readily to mind. The price of this muddling was paid in different ways: the Jews paid it in the gas chambers of the Gestapo, and we British mainly paid it in the final undermining of our economy. Eventually by 1945 Germany's sting was drawn for a second time, and Great Britain was once again militarily stronger.

I remember very well the German collapse of 1945. Several U-boats came into Londonderry harbour, and those of us who had spent several years inventing anti-submarine radar equipment were interested to hear how things had seemed on the other side. The U-boat crews were quite frank in telling us which of our devices had worried them most. They were also quite frank in saying that they would do much better 'the next time'. In 1945 I was innocent enough to believe that there would be no next time. I thought that when a nation has made the same mistake twice, surely the mistake will not be committed for a third time. In 1945, however, I was unaware of the occupational disease of politics, of British politics at any rate; that there is a strong tendency for a man to become transformed into what the Germans call a *politischer Wasserkopf*, a political pumpkin-head. Sure enough, we British are once again making the same old mistake. Already a Germany that was divided, prostrate, and apparently ruined in 1945 is recovering its economic strength in a way that Great Britain has not even begun to do. West Germany has rebuilt much of its ruined cities and industries, has absorbed nearly ten million refugees from East Germany, has an excess of exports over imports, and has made its currency into one of the 'hardest' in the world.

This is by no means all, however. The present Conservative Government, like the Labour Government before it, has agreed, under American pressure, that the Germans be now provided with arms. Here we are again in the grip of our great river. It is so much easier to drift along by giving way to the Americans than to argue the matter; and after all why bother, since if anything goes wrong we can always 'muddle-through', can't we? There is an old saying that the proof of the pudding lies in the eating. It needs no great gift of prophecy to tell what this particular pudding will turn out to taste like.

Let us now pass on to look at the German situation in as impartial a manner as possible. German strength and prosperity have been based on two things: the considerable natural resources and agricultural productivity of the country itself, and the survival into the nineteenth century of what might be called a modified form of feudal system. When this system was finally broken up and Germany became organised into a modern state, certain of the feudal characteristics persisted in the mentality of the average German; in particular, the capacity to work hard and the impulse to defer to authority. The first of these formed the basis of German's economic prosperity, and the second of her military strength. It must be remembered in this latter connection that Germany emerged as a single united State at a time when memories of the Napoleonic invasions were still fresh, and it was therefore natural that military matters should be well to the fore; and, if this were not enough, there was always the example of Great Britain to show how great an advantage was to be gained from aggressive imperialism allied to an aggressive economic policy.

These factors, combined with the new powerful industrial developments of the second half of the 19th century, made it inevitable that Germany should emerge as a great world power. The new railway communication system made Germany the nerve centre of Europe, the new chemical industry provided large quantities of cheap explosives, the new discoveries in engineering made possible a revolution in artillery. Now it was only to be expected that the rapid growth of this lusty young newcomer should be viewed with suspicion by the older régimes, Great Britain in particular being disturbed at the disruption of its traditional ideas of the balance of power. Thus we find the old guard, Great Britain, France, and Russia, tending to conspire to keep Germany from her 'place in the sun'. This policy naturally led to a political tension that mounted steadily from about 1860 onwards, until by the end of the first decade of the 20th century the intensity had become so extreme that only the merest detonation was needed to throw the whole of modern European society into its first violent convulsion.

This analysis places no particular blame on Germany for the first world war. The cause of the war lay in a situation that the participants themselves could barely diagnose, let alone control: did not the Kaiser say "Ich habe es nicht gewollt"? Blame, if it is to be attached, must be distributed equally all round.

Now this was not a point of view that the victorious Allies could take. The leading statesmen of 1918 had absorbed the nineteenth-century belief in the impossibility of a world war. How then to explain that a world war had in fact occurred? There was only one way to avoid discarding former beliefs:

the Germans must be an unnaturally wicked and horrible people. So why bother to treat them in a humane fashion? Hence the Allies were led into such actions as the continuation of the food blockade even after hostilities had ended. Whether this was the main cause of the tremendous depredations of the influenza epidemic in Germany I do not know, but it must certainly have been a contributory cause. Then followed the Allied demand for reparations, with the consequent German economic crises that culminated in the fantastic devaluation of the mark.

These misfortunes smashed German national consciousness to fragments. When prosperity returned there was political chaos with a large group of parties scrambling for power. It was certain that the outcome of this mêlée would be the emergence, as victor, of the party that first succeeded in welding the national consciousness together again. In the event it was Hitler and his followers who achieved this.

Let us now pass on to 1945. The new Allied policy was wiser than that of 1918, but unfortunately what it lost in harshness it gained in ineptness. It oscillated in a curious manner between treating the Germans kindly—but rather after the manner in which pet dogs are treated—and regarding all Germans as being possessed by some inner devil. When the latter mood was on the Allied commanders, they would hie themselves out and blow up military installations right and left, or else they would dismantle some factory and, by way of reparations, send the machinery to places where it could not possibly be used.

The likely consequence of this feeble policy is clear. In 1945 German national feeling was once again shattered to pieces. This gave the Allies a chance to weld the fragments together in a pattern that would have precluded the return of the Hitler mentality. The manifest failure of the Allies to promote such a reassociation means that German national feeling must now revive, *not under the auspices of the Allies*, but through the Germans themselves. Who will dare to predict the form it will take? The dangers inherent in the situation are very grave, and are fully recognised by many Germans. They are worth mentioning.

The Nazi method of indoctrinating the young is too well-known to need description. Suffice it to say that all Germans at present in the age group from roughly twenty to thirty-five suffered a very heavy dose of this indoctrination. Now it is well-known that what is learned with great emphais in youth remains in a man's brain for the rest of his life. It is true that early learning may be suppressed for a while by a change of environment, but should the original environment ever return the original responses will return also.

The relevance of all this is that these young Germans are precisely those who would be called on to supply much of the manpower for a new German army. The danger is quite clear: if there is a solidification of German nationalism associated with a new-found military strength, the old Nazi training must re-emerge of necessity. This I repeat is not conjecture. It is just as certain that a boy trained by the Nazis will not lose that training—his brain will still retain the original memories—as that a pock-mark on his cheek will not be removed by the passing years. And just as there is no moral stigma attached to a pock-mark, so there should be none attached to the young Germans who through no fault of their own were subject to intense Nazi propaganda during their formative years. The situation is otherwise with those of us who did not suffer in this way. We know, or ought to know, that a revived military spirit in Germany cannot but revive the Nazi spirit. If we permit this to happen the responsibility will be ours.

Now I know it has been said that a German army is not to be formed; that what the Allies have in mind is a German contribution to a European army. But this is a bad joke, or something worse. The crucial point of the matter is that the German contribution is to be staffed by German officers up to a divisional level.* A division is not only an effective fighting force in itself, but a division staffed by German

*This being the reported situation in July, 1952.

officers could be transferred at a moment's notice from a European army to a German army—by a moment's notice I mean in a few hours. A division consisting of German soldiers, Dutch corporals, British sergeants, French junior officers, Italian senior officers, and a Norwegian general could hardly belong to anything other than a European army, but a coherent division consisting entirely of the nationals of any one country must be considered as belonging to the army of that country. There is a well known story of a quarrel between Napoleon and Marshal Ney. When Napoleon insisted that as Commander-in-Chief his wishes be obeyed, Ney answered, 'Sire, an army obeys its generals'. In any case it is largely irrelevant whether German divisions remain in the European army or not, because once German rearmament proceeds apace, the European army will soon become the German army. All this is so obvious as to make one suspect the good faith of those who put it forward as an argument. It would seem to be designed deliberately to lull the suspicions of the people.

The Need for New Thinking

A friend who had just returned from abroad said to me the other day, "When I got home it struck me that our people aren't awake. They seem to be doped or something". I asked for more details and was told that we no longer seem to bother about anything, not about working, nor much about playing, nor about the cleanliness of our public places, . . . ; that the post-war British outlook can be summed up in the parrot-phrase, 'We couldn't care less'.

It would be easy to pass off these accusations as the outburst of a disgruntled person, were it not fairly typical of most of those who are fortunate enough to spend some time abroad. I know that some of these statements are likely to arouse the passions, as the French say, but there is no need to bandy opinion with counter-opinion, since this is a matter open to experimental test by anyone who can visit Holland, shall we say, for a fortnight. I suggest Holland as a comparison because the Dutch position at the end of the war was worse than ours; the people were weak through starvation; the Germans in their retreat destroyed a large amount of equipment, especially in the docks; the economic advantages of the East Indian colonies were lost, . . . Let our observer keep all this in mind when he compares present-day Holland with present-day Britain, and I think that he will not come to regard my friend's remarks as an undue exaggeration of the situation.

What explanation can we offer for this? Bad food, the disillusionment of Labour supporters with their Government, the disillusionment of Conservative supporters with their Government? All these are no doubt contributory factors, but the main cause, I believe, lies elsewhere. We have to account, not for just a detail, but for a deterioration in the psychology of the whole British people.* In a previous discussion we found it useful to regard civilisation as represented by a great river, with our nation as a bark sailing on its surface. We saw, moreover, that a stretch of the river has now been reached where the current is so strong that our political leaders no longer appear to be able to exercise any effective control over their craft. So strong indeed is this current that we must expect roaring falls ahead. It is the noise of these falls that the people are at last beginning to hear. It is this, I would say, that is responsible for the state of coma into which we British have unquestionably lapsed in recent times. We all know in our hearts that, unless something pretty drastic is done, we shall soon plunge down over these falls, and should this happen nothing but bits of wreckage can ever again emerge into smooth water.

The great question is what can we do about it? It is here that I wish to bring the contentions of the present chapter to bear. In the first place I maintain that if we sit dumb and leave matters to our politicians, nothing is more certain than that the racing flood will overwhelm us. For it is not in the nature of British politics to look for consistency in argument, or for consistency between the claims of a policy and its results. Politics is played in a different way: vote-catching; never admitting that one has been wrong—these are the rules of politics.

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*It is heartening to be able to say that important signs of a reversal of this trend have been showing themselves during the last six months.

There remains the procedure I am now proposing: that each one of us should snap out of our coma forthwith, and get down quite seriously to the job of considering what has to be done. My contention is that the average man, if only he will get his coat off to the job, is every bit as able to work out an escape route as the professional politician. Ten million heads are superior to six hundred, enormously so if they can reach some agreed policy.

CHAPTER II

A Modest Proposal

'I get no remedy against this consumption of the purse: borrowing only lingers and lingers it out, but the disease is incurable.'

The Symptoms

I had occasion to break one of the Hebrew commandments a little while ago. A friend had just taken delivery of a resplendent new car, and I could not help envying him when I compared it with my own fourteen-year-old shake-bone. The mood did not last, however, for, being a Yorkshireman, I could not avoid noticing that a lot of 'brass' had been paid for the car. This would not have been so bad if one could have felt that value had been obtained for every penny spent; but a great deal of the cost went into taxes, not into the quality of the car itself; and, like most other people, I do not myself feel that money spent in taxes is money well spent. How much in fact goes in taxes I had never quite realised, until I reflected in some detail on my friend's case.

Consider, first, the concealed taxes. If the coal miners did not pay taxes they would be equally well off on lower wages.* This would decrease the cost of coal, which in turn would decrease the cost of the steel used in the motor industry. Similarly the steel workers would be equally well off on lower wages if they did not have to pay taxes, and this would produce a further reduction in the cost of steel. Similarly the workers in all the other industries that provide the raw materials of the automobile trade would be equally well off on lower wages if they did not have to pay taxes, and this would cheapen the finished product still more. Similarly the workers in the motor industry would be equally well off on lower wages if they did not have to pay taxes, and this would again reduce the final cost. Similarly all the companies involved would be equally well off on a much smaller profit margin if they did not have to pay taxes on profits at a rate of some 50%. Similarly the shareholders in the companies would be equally well off on lower dividends if they did not have to pay taxes, and this would allow the companies to work on a still smaller profit margin. Similarly the retail distributor of the car would be equally well off with a smaller rake-off if he did not have to pay taxes. Nor is this the end; it refers only to the hidden taxes. There remains the open tax. Even with all these taxes piled on taxes we have still only arrived at what is usually described as the 'list price' of the car. The 'pay off' comes literally and figuratively with a purchase tax that adds a final 50% to the list price. Notice the impudence of this last step. The list price is not the real manufacturing cost of the car; it is the manufacturing cost *plus* all the concealed taxes. Accordingly, when the purchase tax of 50% is stuck on the list price, we are in effect paying a tax on a tax; the more the hidden taxes, the more the purchase tax.

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*In a strict computation it would be necessary to take account of the fact that taxes paid by the individual are partly returned to him, through subsidies on food, the Welfare State etc.

All in all I would not like to offer an estimate of what proportion of the price paid by my friend represented the true cost of his car. From what has been said it will be realised that an intricate piece of accounting would be necessary to separate the true cost from the massed phalanx of taxes. I would feel quite safe, however, in suggesting that taxes accounted for more than a half of the price paid; I would guess the proportion to be nearer two-thirds. It may be larger still.

Nor had my friend yet finished with the tax-gobblers. As he had no wish to leave the newly acquired car idle in a garage, a further tax had to be paid to enable it to be driven on the public highways. The status of this latter tax is now notorious: ostensibly raised in order to pay for the upkeep of the roads, it has in recent years been poured down the gobbler's throat, along with the rest. To be precise, during the last six years this tax, together with the tax on motor fuel, has yielded about £1,000 m; the amount actually allotted to the roads has been no more than £165 m.

Lest it be thought that taxes connected with the automobile trade are to be interpreted as a case of 'soaking the rich' to provide for the poor, it should be pointed out that exactly similar considerations apply to a wide range of other articles. It should also be pointed out that the present Conservative Government, which is thought by some to represent the interests of the rich, is just as keen to maintain the taxes in question as was the Labour Government before it. We might have chosen examples of equally crushing taxes affecting in a similar degree all sections of society; taxes on beer, on cigarettes, entertainment, cosmetics, and on the humble family snapshot. My reason for choosing the motor trade was simply to show up the nature of concealed taxation. This is perhaps revealed in a clearer light by the case considered above than it would have been if instead we had chosen to discuss beer, say, or tobacco.

The thoroughly pernicious character of concealed taxation needs emphasis. We all know about direct income tax and about purchase tax, but normally we do not stop to think when we buy an article of the welter of taxes that have already been met before it ever found its way into the shops. Today the tax-gatherer's net runs through the whole of our national economy.

Now what does it all mean? Why is it that all these taxes have to be levied? A superficial answer to these questions would be to say that the Government has heavy expenses to meet: education, national health, pensions, food subsidies. But these items are too small to consume anything but a fraction of the vast flood of taxes that stream daily into the Treasury. Certainly we can come nearer a balance between ingoings and outgoings if we include moneys paid out to the Fighting Services. Yet it is difficult to attribute our present taxation jungle solely to the Services allocations of recent years. If anyone maintains the contrary we ask: How then should it be that perfectly normal defence preparations have put such an intolerable strain on our economy? Are we not a Great Power, and should not a Great Power be able to take reasonable precautionary measures to defend itself without the symptoms of an economic collapse manifesting themselves? These questions are, I think, unanswerable, unless we suppose that the symptoms of economic collapse were in fact already present before the precautionary measures were taken. In other words the Services allocations may possibly have broken the camel's back, but they were only a last straw.

Another parrot-cry that needs knocking on the head is the often repeated statement that we are still suffering from the effects of the late war. How are we suffering? We grow more food than we did before the war, and our industrial production is now higher than it was then. So what were 'the effects' of the late war? In answer to this it might be claimed that large sterling balances were built up during the war by the Dominions, Egypt, India, etc., and that we have had the burden of repaying these war-time debts. The argument is specious, however, because so far we have paid back no more than we have received in loans and gifts from the U.S.

There is indeed a sense in which this parrot-cry may be said to have validity, but this is not the sense usually intended. For a century or more Great Britain has been sinking into an unsound position. One outcome of the decline has been the spending of foreign capital investments, already noted in the previous chapter. That is to say, we have been exporting less than we have imported. In the past, the gap was bridged by a slow spending of foreign capital investments. The war accelerated this spending, so that now we have far less foreign capital available to throw into the export-import breach. This is the first way in which the war genuinely worsened our position. A second way in which our position has worsened is through the rising cost of food. This matter is worth discussing at some length.

When Great Britain was the only industrialised country, when all other countries were basically agrarian in their economies, it was natural that we should have been able to command a high export price for our manufactures and that food should have been comparatively cheap for us to import. Such is the advantage of monopoly. It was also natural to expect that our position would gradually become less advantageous as other countries became more industrialised. Such is the result of the breaking of a monopoly. Thus it should be no surprise that Great Britain's trading position has gradually become less and less favourable. Yet politicians have always said or implied that our troubles lie in some temporary fluctuation that can be put right by a book-keeping device, or by some incantation or other. To give an example, the late war produced a serious worsening in our position, food prices rising sharply both during and after the war; but an examination of the food policy of the late Labour Government shows it to have been based on the notion that the rise was of a temporary character: presumably on the shallow view that 'what goes up must come down'. Why should food prices come down? The recent rise has been no more than an acceleration of an old trend; a trend, moreover, that is still very far from being exhausted. Instead of admitting this, Labour Ministers tried to pass the matter off by saying that the prices being asked, for example by Argentina, were 'quite unfair'. This sounds lame, and it is lame. 'Fairness' and 'unfairness' are not meaningful concepts where trade in the modern world is concerned. Prices are fixed, not by moral precepts, but by how much can in fact be got for the goods in question.

We are now in a position to interpret the activities of the tax-eaters; it is an interpretation already foreshadowed in the previous chapter. Faced with the inexorable rending apart of the gap between exports and imports, successive British Governments have allowed themselves to be forced into a series of desperate short-term measures. When rising import prices could not be matched by rising export prices, the solution was thought to lie in an increase in the volume of exports; to increase the volume of exports, it was thought necessary for people to work harder than before, in return for less than before; to get people to work harder, higher wages had to be paid; to prevent too many goods being bought with these wages, fantastic taxes had to be imposed. At last, therefore, we come to see the reason that underlies the modern disease of tax-gobbling. The collection of taxes is not primarily designed to meet Government expenses, as was the case in former times, but to restrict the consumption of goods. My friend was taxed to the hilt when he bought his car because it is not Government policy that British subjects should be allowed to buy new cars at their economic cost: if a person insists in the name of liberty in buying a car, the Government intention is that as far as can be contrived he shall be left with insufficient money to buy anything else.

A man on the verge of bankruptcy is often forced into a sort of financial jugglery in which every move he makes turns out to defeat its own ends. The same thing applies in good measure to the financial steps taken by successive British Governments. Punitive taxation has in many respects done just what it was intended to prevent. It has been one of the largest factors in promoting post-war inflation; it has acted as a deterrent to harder work; and it is a primary cause of the general psychological malaise that has become so prevalent in recent years. Concealed taxation has worked its way, like a cancerous growth, through every facet of our national life, and the patient is now sick, deadly sick.

The issue that lies before us in this chapter is: What are we to do about it? Do we want the present situation to continue indefinitely? As I presume we do not, let's ask the further questions: How can we suppose that it can possibly come to an end? How can world conditions ever be more favourable to us than they have been during the last five years? The temporary shortages produced by the war made it possible for us to sell our manufactures freely; we have been operating in a 'seller's' market. Is this going to continue now that our German and Japanese competitors have recovered much of their former economic strength? Is it going to continue when the general post-war world demand for industrial goods slackens off? Is the series of loans and gifts from the U.S. going to continue indefinitely? Are the Dominions going to support us indefinitely by sending us food on favourable terms? More and more countries are becoming industrialised, so is the price of industrial goods going to rise? More and more people are being born into the world, so is the price of food going to fall?

I think one does not need to be a black pessimist to realise that things cannot be allowed to drift along indefinitely as they have been doing during recent years; all the indications seem to me to be that Great Britain's economic position will get steadily worse unless the real cause of our sickness is properly diagnosed and cured. It is true that slight uplifts might occur from time to time, but the long-term trend would be downwards. To reverse this trend will certainly not be easy—the very gravity of the situation shows that there can be no simple cure—but a man would indeed be faint-hearted if he refused to consider the problem just because serious difficulties and inconveniences are certain to turn up. Yet this seems to have been just what post-war British Governments have done.

There has been a reason underlying my previous criticisms of politicians that I can now explain. Political parties act at the dictates of economic necessity, and not at all as they claim to act. A critic might be tempted to say, 'Well what is wrong in that?' He might go on with the argument, 'The Labour Party, for example, genuinely wished to improve our food rations, and it only failed to do so because of external circumstances. Why should this be held against the Labour Party? What right have you (meaning me) to be so scornful about the Labour Party, or for that matter about the Conservative Party?' Well, in the first place, the contrast between the failure of the political parties to deal with the 'external circumstances' and the grandiose character of their claims, simply invites the scornful remark. What should we think of a man who contrived to select himself and insisted on opening the batting for England in a series of Test Matches, and who was invariably dismissed for a trifling score? Should we excuse him on the grounds that the bowling was good?

The main point I have had in mind all along, however, has been the failure of the politicians to make the real situation clear to the people. Even assuming that the Labour Party had made so little study of the economic history of Great Britain that in 1945 they were unaware of the real nature of the 'external circumstances', the error should have been corrected by 1947 at the latest. Then, instead of continuing with the nationalisation nonsense, the full gravity of the situation should have been widely publicised and there should have been a nation-wide search for a cure. Had this been done, five valuable years would have been gained, five years that we can ill afford to have lost. Nothing, it seems to me, can excuse the Labour Party and the Conservative Party for having continued their game of political patball throughout these crucial years. Time is not on our side; when we as a nation eventually waken up to the full urgency of our situation it may well be too late.

The Diagnosis

Perhaps the clearest way to approach the diagnostic problem is to review the resources of Great Britain in an abstract sense. Thus, instead of concentrating too much on our present position, let us consider what advantages our territory has to offer, and then let us go on to see whether or not we are making the best possible use of them.

In the first place, Great Britain is an agriculturally rich country. Take the following average yields for wheat production.*

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*From the revised edition of *World Resources and Industries* by E. W. Zimmermann, published by Harper Bros. Other tables in this and the following chapters make further use of data given in this book.

WHEAT PRODUCTION

Country	*Yield in bushels per acre (1946-8)*
Denmark	45·8
New Zealand	37·0
Great Britain	33·0
Egypt	25·5
France	22·6
Italy	19·7
U.S.	17·8
Argentina	16·7
Canada	15·8
Australia	13·4
U.S.S.R.	10·8

Nor is the amount of wheat grown in Great Britain at all negligible. Thus the quantity of wheat grown in Great Britain surpasses the needs of the agricultural workers and their families by a very large margin: the excess of wheat being about five times greater than would be needed to satisfy their requirements.

For the rest, let us compare Great Britain with the U.S. I have chosen the U.S. as a standard of comparison because the U.S. is far and away the world's outstanding food producer; this will become apparent in later discussions. To see how our little island measures up in this test we note that the ratio of the land areas of the two countries is about 32/1. Against this, the wheat and oat production of the U.S. only exceeds Great Britain in the ratio 6/1; in cattle and calves the ratio is about 8/1, in egg production 9/1, in milk 7/1, in sugar 3/1, in pigs 11/1, in sheep 2/1. It is true that in some crops, notably cotton and maize, the U.S. has a very large production whereas Great Britain has effectively none. Cotton, however, is not a foodstuff, while its importance as raw material for clothing is offset by the favourable British sheep ratio, which of course implies a favourable wool ratio. Maize, moreover, is largely used in the U.S. as a feeding-stuff to animals, notably to pigs. This is reflected in the pig ratio, which at 11/1 is the value most favourable to the U.S. Yet even a ratio of 11/1 is still substantially better from the British point of view than the land ratio of 32/1.

Without any need for further detail, we see therefore that Great Britain is an extremely rich country. There are very few pieces of land of comparable size in the whole world that can be compared with it in fertility of soil: New Zealand, the Netherlands, Denmark, and that is about all.

Now let us take a hypothetical situation. Let us suppose that Great Britain was to begin with quite empty of people. Then first put the farmers and agricultural workers back on to the land, and imagine them to be equipped with tractors and other farm machinery. If we stopped filling the country with people at this stage, there can be no doubt from what has just been said that Great Britain would be phenomenally well off in its food resources. So far from our present unsatisfactory diet, the population by eating only a fraction of what it produced could live 'like lords'. Not only this, but since the world is very short of food and is becoming increasingly so, there would be no difficulty in securing a market for the substantial food surplus that would be available. The currency so obtained could be used to provide for the importation of tractors, automobiles, oil, . . .

Better still, however, basic materials, such as sheet steel, could be imported and a small home industry be set up to manufacture the machines essential to an agrarian economy. As the industrial population required for this limited production would be only a small percentage, say about 10%, of the land workers, it would clearly be no problem to feed them.

To be more precise, the State we have just been visualising would contain no more than about five million people; children, old people, wives and workers all included. The broad features of its economy would have similarities with the present economies of Norway and of Holland, with the important difference that things would be far more favourable for our imaginary Britain than it is for either Norway or Holland. Norway is poor agriculturally while Britain is extremely rich. Norway in consequence has to base its economic policy on a large-scale fishing and mercantile industry, which has the disadvantage of requiring a heavy capital outlay on ships and ancillary equipment. Nevertheless, so important is food in the world today that Norway has managed to make its fishing industry into a profitable concern. This should not be misinterpreted, however, into the supposition that Norway's fishing represents an adequate substitute for the agricultural productivity of our agrarian Britain. For Britain could fish too, on the same scale as Norway does now, if it were judged desirable to do so.

Nor can the case of Holland be compared with agrarian Britain. It is true that Holland and Britain are comparable in agricultural fertility, but Britain has more land, and Holland has too many people. The present population of Holland is in the neighbourhood of ten millions; twice the population of our hypothetical Britain. The visitor to Holland who has compared the comparatively good food situation there with the miserable diet of actual present-day Britain will at once realise how far the diet that would be available in our imaginary agrarian Britain would surpass anything to be found in the world today, the U.S. included.

To put the matter in the briefest way, the State we have been considering can be described as Tudor England with modern conveniences. If it were possible to test the matter by experiment, it might be predicted that such an idyllic Britain would, in spite of its small population, outstrip the present very much jaded and faded Britain in both intellectual and physical activities; it would, I think, produce better writers, perhaps fewer but better scientists, better athletes, better artists, better cricketers, better musicians. . . .

Now all this takes no account of the industrial potentialities of Great Britain. As we all know, for its size Great Britain is also very well served by its industrial resources. The first essential of industry is a source of primary power; oil and coal being the sources mainly in use in the world today. Great Britain is poor in oil, but wealthy in coal. Consider the estimated coal resources of the various countries. First are three countries with outstanding quantities: the U.S. with a favourable ratio of 10/1 as compared with Great Britain, China with about 5/1, and the U.S.S.R. also with about 5/1. Then follows a group with roughly equal resources: Germany, Canada, Great Britain, South Africa, and Australia. The remainder are comparatively poor: Poland is next with an adverse ratio of about 1/4 as compared with Great Britain, Czechoslavakia 1/8, India 1/10, France and Japan each with 1/12.

Iron ore is the other great requirement of our civilisation, grounded as it is on the production of iron and steel. Great Britain possesses large deposits of medium-grade iron ore. At present this ore is enriched by mixing with higher grades imported from abroad. This practice is, however, becoming increasingly less necessary as technological developments allow the medium-grade ore to be smelted profitably without substantial enrichment. That is to say, we are reaching the stage of industrial development when Britain's own vast iron resources can be used as they stand without imports of ore being necessary.

Another important feature worth mentioning is that total coal reserves can be somewhat misleading. Thus special grades of coking coal are required for smelting purposes. In this Great Britain is again very well served, as the following overall comparison with other countries will show.

United States

Very rapid exhaustion of rich iron ores, placing the U.S. in a similar position to Great Britain in having to rely either on the importation of high-grade ores, or on the profitable use of medium-grade ores. The quantity of coking coal is only a small fraction of the total coal reserves.

U.S.S.R.

Rich iron ore deposits now being worked, with the prospect of eventual exhaustion, as in the case of the U.S. Coking coal and ore deposits usually separated by large distances.

France

High-grade ores available, but little coking coal.

Germany

Adequate coal supply, but only low-grade ores.

Belgium

Little coking coal available, and only a small ore reserve.

These remarks already provide evidence of the industrial capacity of Great Britain. This evidence will be much strengthened in the later parts of this chapter.

Let us return now to our hypothetical analysis in which we adjusted the population of Great Britain so as to meet the needs of an essentially agrarian State. At a level of about five million people we saw that such a State must be extremely prosperous. Then surely, if we add further people so as to allow the iron and steel industry to be developed, there must be an even higher level of prosperity? Thus there would follow all the profitable derivatives of the iron and steel industry; these vary over the wide range from shipbuilding to the making of pins. Add to this a textile industry based on the large number of sheep that are kept, notably on the northern uplands, and we have the makings of a truly remarkable level of prosperity.

We turn the matter round now by asking: Why have we not got this remarkable level of prosperity? Why in fact have we got the very antithesis of prosperity? Well, so far nothing has been said about the number of people that would be required to effect the industrialisation of Great Britain. It is here, of course, that the rub comes. Even with old-fashioned methods, twenty million people—wives, children, old people and workers

—would probably be more than ample; with present-day methods fifteen million would, I estimate, be sufficient; and with the new methods already foreshadowed in modern scientific research, perhaps even less than ten millions would be enough. Let us take as an intermediate estimate a *total* population, agricultural plus industrial, of but twenty millions. It is emphasised that this figure of twenty millions does not refer to workers alone, but to workers and their families, and to people too old to work. A comparison with the actual population of about fifty millions answers at once all questions concerning our present economic difficulties. No nation, however rich in resources, can stand more than a limited excess in its population load: pile in enough people and sooner or later the economy must crack under the strain. The wonder of Great Britain is that so many people have been piled in before the breaking point was reached. Indeed Britain's amazing richness is to be measured by the fact that a nation that could work most efficiently with a population of twenty millions, or less, has been able to carry the gigantic burden of a thirty million excess for so long. The U.S. is said to be a very wealthy country, but add a further fifty millions to the present population of a hundred and fifty millions and a severe strain would be felt; add a further hundred millions and it is more than likely that the U.S. economy would be entirely broken.

Now it may be said that my estimate of twenty millions as a population optimum has been struck without allowing for people not directly engaged in agricultural or industrial production, but who are nevertheless essential to the running of a modern State. We require people to be employed in building, transportation, education, administration. . . . Of course we require such people; the question is, how many? A few comparisons may be useful before an answer to this question is suggested. In the England of the sixteenth century three or four million people managed to till the fair face of Elizabeth's kingdom, to administer the State, and to produce what is generally acknowledged to be the highest level of literary culture yet attained in any State at any time. In New Zealand one and a half million people manage to run a country of comparable size to Great Britain, but with a more difficult terrain, to maintain a high cultural and social level, and to produce enough food to place New Zealand among the world's largest food-exporting countries, as will be seen from the following table:

EXPORTS IN THOUSANDS OF METRIC TONS.

Meat (1947)		*Butter (pre-war)*		*Cheese (pre-war)*	
Argentina	694	Denmark	149·1	New Zealand	87·7
New Zealand	366	New Zealand	140·1	Holland	59·6
United States	270	Australia	99·8	Canada	32·9
Australia	234	Holland	49·5	Italy	19·8
Canada	191	Sweden	22·8	Switzerland	17·1
Denmark	134	Ireland	13·3	Denmark	8·1
Uruguay	126	Argentina	8·3		

In Australia a population of less than eight million people has managed to administer a whole continent, to have developed an outstanding although specialised agriculture, to have started a flourishing young industry, and to have on the whole whacked Great Britain on the cricket field. Canada, with but thirteen million people, administers an even larger territory; and at the same time has managed to develop into what is widely recognised as the world's most promising young nation. In view of these facts it would not be taking an extreme view if we were to suggest that a population of twenty millions for Great Britain should be taken as also including all the people engaged in non-productive services; but to avoid any suggestion of exaggeration let us strike a final figure of twenty-five millions. The extra five million people makes a more than ample allowance for those not directly engaged in productive work. In return for this generous allowance we shall expect skilful handling of our international business and political affairs, an extremely high standard in the arts and sciences, the finest of buildings, the most rapid and comfortable transportation, a thriving shipping industry, an excellent educational system. . . .

Here, then, we have the diagnosis plainly before us: *Too many people sharing the available resources.* Before we move on to consider the cure, it is of interest to enquire how the present fantastic situation arose, and how it is maintained. How, for instance, do fifty million people contrive to occupy their time when real work for only twenty-five millions is available? The answer is: partly by inventing unnecessary jobs, and partly because the sheer size of the present population creates a lot of work that would not be at all necessary if the population were only twenty-five million people. All our non-productive services: the building trade, public transport, educational institutions, the whole arrangement for the distribution of goods ranging from large-scale docking facilities to the small shopkeepers, the catering trade, holiday resorts, the legal profession, the medical profession; in all these, and many others, there are vastly more people occupied than would be the case with our twenty-five million population.

Where the need is least for a particular organisation to pay its way, there will the greatest redundancy of administrators be found. Government offices are of course notorious in this respect. Surprisingly enough, even in commercial firms, where profits have to be made, the disease is still rife. Every so-called improvement in office technique—typewriters, telephones, dictaphones—instead of cutting down office administration has actually increased it. It is well known that nowadays, despite all these improvements, a large office staff is usually required to do the work that formerly was competently carried out by an old man, a boy, and a dog.

While the origin of the ailment lies, of course, in the great redundancy of population, the psychology of its working may also be mentioned. Every person engaged in administration realises at once that his own importance to the organisation of which he is a member is assessed, not so much by his actual labours, as by the number of people that work 'under' him:

'added responsibility' as it is usually called. Consequently he strives might and main to increase this number, and since every other administrator also does the same, there is a strongly directed pressure that tends to swell the bubble ever further and further.

The most striking symptom of the disease is the widespread application of the committee system. It is commonplace for higher-grade administrators to belong to thirty or more different committees, and for them to spend as much as a third to a half of their time in attending meetings. Since little, if anything, is ever done at these meetings, the time wasted in this manner assumes very considerable proportions; be it noted that if a committee is called on to decide some matter, one of two courses will be followed: either the secretary will do all the necessary work himself or a small 'working party' will be appointed to make a recommendation; the committee itself *never* does any real work, it only wastes time talking round, and round, and round what the secretary or the 'working party' has said. The committee system is the ultimate administrative triumph. No greater time-consuming activity has yet been discovered, or is likely to be, short of some system that takes its devotees not to the verge only but into an entire collapse of the human reason.

To complete this section of the argument, I should like to consider the manner of origin of Britain's present gross over-population. First we notice that over-population is not a surprising phenomenon: it is to be expected wherever the death-rate is not unduly high. We are all familiar with the almost explosive way that guinea-pigs can increase in number. The case is similar for humans, except that a longer period is required for a specified increase of population. With the modern British death-rate, it is easily within the reproductive power of humans to increase the population a thousandfold in ten generations; in but twenty generations—600 years say—the population could be increased a millionfold.

An analogy may be useful for understanding how populations change. Represent the population by a reservoir, represent births by the inflowing water, and represent deaths by the outflow. On dividing the rate of inflow by the total amount of water in the reservoir we obtain the 'birth-rate'; and on dividing the rate of outflow by the content of the reservoir we obtain the 'death-rate'.* For a stable population—for the reservoir to keep of constant size—the inflow and outflow must balance. This requires the birth-rate to equal the death-rate. If the birth-rate exceeds the death-rate the population rises. If on the other hand the death-rate exceeds the birth-rate, the population declines.

Let us apply these considerations to changes in the British population. Until about the middle of the 18th century the rise of population was slow in spite of a very high birth-rate, for the reason that the death-rate was then also very high. In the second half of the 18th century the death-rate seems to have decreased, while the birth-rate remained essentially at its previous high value—the outflow decreased and the inflow remained constant. There was consequently an appreciable rise of population, a rise to a level of some ten millions. It was this rise that caused the disturbed social conditions of the early 19th century. Had British resources remained constant, the lowering standard of life occasioned by the rising population would probably have persuaded the people to reduce the birth-rate until a new balance was reached. Britain would then have remained a backward, impoverished country, with its population stabilised at about double the optimum level. The coming of industrialism prevented this from happening.

Now the advantages accruing from industrialism were not a reward for the exceptional skill and inventiveness of the British people, as has sometimes been maintained. Industrialism represented the culmination of an attitude of mind that had been developing slowly in Western Europe for about a thousand years. Industrialism happened through essentially chance circumstances to bear its first fruits in Britain a decade or two before it ripened elsewhere. Industrialism provided an extension of human resources the like of which has only happened once or twice in the whole of man's history. It was our forebears of the 19th century who reaped this rich harvest. Instead of using their special good fortune to put Britain's economy into a sound condition, the opportunity was frittered away, however; present-day Britain is now back in the same dilemma as that which faced the Britain of 1800.

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*It will be seen that the officials of a small American town could not have had this definition in mind when they were replying to a questionnaire from Washington. To the query, 'What is your death-rate?' they answered: 'Our death-rate here is the same as everywhere else. One death for every inhabitant.'

We can readily trace the steps whereby the complacent 19th century reduced the 20th century to penury. Industrialism made it possible to provide a much larger population with the same low standards that characterised the early years of the 19th century. The outflow from our reservoir decreased still further, while throughout most of the 19th century the inflow remained well-nigh at the maximum attainable rate: it is not within human capacity for monogamous families to number much more than twelve or fourteen children. In spite of the inflow thus remaining at flood capacity, and in spite of the steadily falling outflow, the population still did not rise by a factor large enough to consume all the advantages of industrialism. For this we must certainly be thankful, but we need not be grateful. We owe no gratitude for the crumbs that have come down to us: what the 19th century could do to bring ruination on us, it did in full measure. The population rose from the ten millions or so of 1800 to over twenty millions in 1850, and to nearly forty millions in 1900.

It remains to consider the population rise of the last half-century, the rise to the present level of about fifty millions. This has been occasioned by the circumstance that the proportionate outflow from our reservoir has dwindled to a comparative trickle. Medical science and improved sanitation have together reduced the death-rate to a small fraction of what it was in the 18th, or even in the 19th, century. It is true that the reservoir could have been kept of constant size—equal to the population of 1900, for instance—if the inflow had been proportionately reduced. But too low a birth-rate has serious unfavourable implications. A very low birth-rate must lead to a lowering of the representation of youth, and to an increase in the representation of age, in our population. Such a shift from young to old would have unacceptable social and economic effects.

We see therefore how it has come about that a great volume remains apparently trapped in our reservoir. Short of a deliberately induced increase in the outflow—and this is scarcely open to serious discussion, there is no straightforward way of reducing the present population. We cannot decrease the inflow without unacceptable consequences and we cannot increase the outflow because strong social conventions prevent us from artificially stimulating the death-rate. It is indeed certain that there is no simple solution to our present population difficulty. We may conclude therefore, on general grounds, that an effective solution must be of a quite unusual nature: traditional policies cannot be expected to be of serious import.

The solution suggested in the following section should be considered from this point of view. There is no suggestion of a patent remedy. The proposals are admittedly untried, but there is a backing of cogent reasoning behind them. It is suggested that we reduce the size of our reservoir, not by cutting off the inflow or by increasing the outflow, but by evaporating out some of the water and by arranging that it should fall again on territory that is at present in a somewhat too dry condition.

The Cure

Methinks I am a prophet new inspired
And thus, expiring, do foretell of him:
His rash fierce blaze of riot cannot last;
For violent fires soon burn out themselves;
Small showers last long, but sudden storms are short;
He tires betimes that spurs too fast betimes;
With eager feeding food doth choke the feeder:

Light vanity, insatiate cormorant,
Consuming means, soon preys upon itself.
This royal throne of kings, this sceptred isle,
This earth of majesty, this seat of Mars,
This other Eden, demi-paradise;
This fortress built by Nature for herself,
Against infection and the hand of war,
This happy breed of men, this little world,
This precious stone set in a silver sea,
Which serves it in the office of a wall
Or as a moat defensive to a house,
Against the envy of less happier lands;
This blessed plot, this earth, this realm, this England,
This nurse, this teeming womb of royal kings,
Fear'd by their breed and famous by their birth,
Renowned for their deeds as far from home,
For Christian service and true chivalry,
As is the sepulchre in stubborn Jewry
Of the world's ransom, blessed Mary's Son:
This land of such dear souls, this dear dear land,
Dear for her reputation through the world,
Is now leased out—I die pronouncing it—
Like to a tenement or pelting farm:
England, bound in with the triumphant sea,
Whose rocky shore beats back the envious siege
Of watery Neptune, is now bound in with shame,
With inky blots, and rotten parchment bonds:
That England, that was wont to conquer others,
Hath made a shameful conquest of itself.
Ah, would the scandal vanish with my life,
How happy then were my ensuing death!

Lest John of Gaunt's opening phrase be thought to have any apt relation to what follows, it should be pointed out that what is now to be said has already been suggested by many others. My reason for adding to the volume of writing on this subject is simply that these things cannot be said too often.

The present proposal, put in the bluntest manner, is that twenty-five million people should be moved out of Great Britain at a rate of about one million per year, and that this migration should be so co-ordinated with the rapid expansion of industrialism in the Dominions, notably in Canada and Australia. In figures, the proposal is that the present top-heavy population distribution:

Country	*Approximate Present Population*
Great Britain	50 millions
Canada	13 ,,
Australia	8 ,,
Africa* (white population)	2·75 ,,
New Zealand	1·5 ,,

should be converted into a table more of the form:

Country	*Approximate Population Suggested*
Canada	25 millions
Great Britain	25 ,,
Australia	15 ,,
Africa	5 ,,
New Zealand	5 ,,

Let us examine the purely physical implications of this proposal; we shall come later to consider the psychological aspects. Now, in the first place, there is no inherent difficulty of transportation in such a migration plan. A man eats his own weight of food in about two months. Hence it is clear that from a mechanical point of view it would be simpler to export people than to go on importing the food that is needed to feed them. This of course makes no reference to travelling comfort, but comfort is a psychological rather than a physical issue.

We have seen that with a population of twenty-five millions Great Britain could itself be a highly efficient, prosperous, self-supporting unit. The implications of the scheme depend, therefore, not on the outcome so far as Great Britain is concerned, but on whether a high level of prosperity in the Dominions could be maintained at the population levels suggested above. A general review of the economic potential of the whole British Commonwealth is accordingly necessary to examine this matter. By way of introducing such a review, it is of interest to note a few historical points.

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*Union of South Africa and British Colonies.

The past development of the Dominions has largely been conditioned by the self-interest of Great Britain. Thus, Great Britain, as an exporter of manufactured goods, had no interest in the industrial development of the Dominions; indeed since Dominion industrialisation must have reduced export markets, Great Britain has in many ways actually acted so as to discourage it. The situation was otherwise with food production. Since it was to the advantage of Great Britain that large supplies of cheap food should be available, the Dominions were encouraged to develop essentially agrarian economics. The idea was, of course, to sell manufactured goods at high prices to the Dominions, and to receive food at low prices in return. How was this contrived? Largely by the simple device of withholding the means of capital development.

Let us examine the fruits of this policy. The sharp rise of world food prices and the comparative fall in the cost of manufactured goods have put an end to this former exploitation of the Dominions. Great Britain is now poor and the Dominions wealthy, instead of the other way round. Not only this, but Great Britain would be a good deal poorer still if the Dominions insisted on driving a hard bargain for their food surpluses. This will become clearer from the following analysis (1952) of the sources of Great Britain's food:

Wheat	Dominions supply 60%.
Edible Oils	Colonies supply over 40%.
Meat	Dominions supply 30%; Home contribution 50%; Argentina 6%.
Butter	Dominions supply 50%.
Cheese	Dominions supply 55%.

It may perhaps be a matter of surprise that the Argentine contribution to our meat supply is so small. Yet everyone is aware of the embarrassment caused by Argentine demands for higher and higher prices. What would be the situation if the Dominions made equal efforts to exact the highest possible prices for their food? This they have not so far done because they 'have no wish to make Britain's already difficult position worse'. To speak plainly, Great Britain has now been living on the forbearance of the Dominions for some time. A recognition of this forms one of the strongest of the reasons for believing that we cannot hope to reach financial stability through present policies. Things must get worse because inevitably, as more and more people are born into the world, food will become scarcer and scarcer. Eventually the Dominions will tire of sending us food at give-away prices—which will be the only sort of prices that ultimately we shall be able to afford.*

The development of Canada affords one of the most striking demonstrations of the stupidity of British fiscal policy. Starved of adequate financial backing by Great Britain, it was natural that Canadians should turn more and more to the U.S. As a consequence the financial organisation of Canada has become intertwined more with that of the U.S. than with the British economy: Canada belongs to the 'dollar area'. What this now costs us will be plain from the fact that more than one-third of Britain's expenditure of 2,048 million dollars in 1951 was earmarked for purchases from Canada. This means that more than 700 million dollars is now added to our annual dollar indebtedness, simply through past British failure to see anything more in Canada than a source of cheap food.

Anyone who feels that those who set themselves up to govern us must know their business should try to find an explanation for this other than on the score of pure idiocy. He should explain further why, having made the mistake of trying to keep down, rather than to assist, the industrialisation of Canada, the mistake has been repeated in recent years; for not only is it not being rectified but controls have been deliberately imposed—by both the L.P. and the C.P.—to make it well-nigh impossible that any British person should advance capital to assist in the development of Canada.

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*There is no exaggeration in this statement. Recently, owing to some economic complexity, a shipment of New Zealand beef became diverted to San Francisco, where it was sold at 'British prices'. The effect on Americans was electric as soon as it became known that the British prices in question were just about one-third of normal American prices.

To underline the point, it may be worth noting that, only a few months ago, Sir Douglas Copland, then Vice-Chancellor of the National University of Australia, advised that Australia's capital needs would best be met by loans from the U.S. One may cock an eye at the accompanying assurance that this would not imply a drift of Australia away from the 'sterling area'. Of course it would—if the loans raised in the U.S. were large enough to make a substantial difference to the Australia economy.

The above diversion from our main discussion serves to bring out a crucial point concerning the migration scheme. The scheme is almost certainly not workable if it is conceived only as a means for getting Great Britain out of a serious difficulty: unless it offers the prospect of a substantial gain to the Dominions themselves it scarcely deserves serious consideration. Thus if the idea were simply to hand on the problem of Great Britain's excess of numbers to someone else, to leave them to deal with the difficulty instead of facing up to it ourselves, to attempt to share someone else's prosperity, then we need take the matter no further. This is not at all the point of the migration proposal, however. The point is to develop enormous resources that are at present lying idle.

Canada was for long thought of as an agricultural country. It has only gradually become plain that the industrial potential of Canada is comparable with that of the U.S. itself. To effect the full employment of Canadian resources, as they are now known, will require considerably more than the present population of 13 millions; the suggestion of an eventual 25 millions might still seem too few. The industrial methods of the future will, however, be vastly more efficient in the use of manpower than our present methods. Thus it is not at all impossible that 25 or 30 million people in Canada might achieve an eventual industrial output of the same order as the present U.S. production. This matter will be discussed at greater length later.

A similar situation applies in Australia. Estimates by Australians themselves of the number of people required to effect full development of their continent have nearly all been in the range from 20 to 25 millions. Our suggestion of 15 millions might therefore seem to be rather on the low side, but, just as in the Canadian case, the industrial methods of the future will be so much more economical in the numbers required to operate a major industry that I suspect 15 millions of being a better target figure. At the same time it will be realised that, should 25 millions in Canada and 15 millions in Australia prove too low, more people could still be taken from Great Britain. The estimate of 25 millions for Great Britain was arrived at as an upper limit of the British population. A figure as low as 15 millions might very likely be a better value, allowing the numbers in Canada and Australia to rise to 30 millions and 20 millions respectively.

The estimates for New Zealand and Africa also deserve comment. At present the population of New Zealand is probably too low for maximum efficiency. Thus at the moment New Zealand is dependent on imports for a multitude of small manufactured goods that could quite conveniently be produced on the spot, thereby cheapening the cost of the goods through a reduction in the number of 'middle men', and by a saving of freightage charges. The general plan would be for light industries to be established on a moderate scale, steel being imported from Australia. It might well be possible for the industries to be operated to a very substantial degree by hydro-electric power. The country would still remain essentially agrarian in character, however, with a capacity to feed more than the estimated population of 5 million.

The population estimate of 5 million for Africa may seem somewhat excessive. It is true that in many respects both the Union of South Africa and the British African Colonies require development. For example, Rhodesia, one of the world's richest producers of non-ferrous metals, possesses a railway transport system that would disgrace an English country district. Although there is certainly scope for a deal of straightforward development on these lines, I had something further in mind in offering the 5-million estimate. In the next chapter we shall be concerned with the question of the world's food production, and we shall see that the extensive organisation of tropical agriculture provides one of the most feasible ways of doing this. Should such a possibility come to be actively investigated, as the present indications are that it must, Africa will assuredly be of the first importance to the project. Thus the potential food-production capacity of tropical Africa is very great indeed, and should such territories as the Congo basin become developed from this point of view, it is fairly certain that an extensive African industrial expansion will also occur. It is in relation to this possibility that the 5-million estimate was made.

All these remarks must now be placed into their proper perspective by a brief outline of the total resources of the British Commonwealth. To get an idea of the extent of these resources, we shall use the U.S. as a comparison standard. Agriculturally, the U.S. has the advantage, but not by a great margin. The population ratio of Britain and the Dominions (whites) to the U.S. is close to 1/2, whereas the growth of cereals for human consumption, the number of cattle, milk production, butter, and cheese are also in a ratio close to 1/2. Apart from oats, where the ratio is again close to 1/2, the growth of crops for animal consumption favours the U.S., however. This shows itself in a pig ratio of 1/4, and an egg ratio of 1/8. To offset which, we note that the Commonwealth is better off in sheep by 3·5/1. The consequently greater Commonwealth production of wool cancels the U.S. advantage in the growth of cotton. In sugar the ratio is roughly 1/1. In potatoes the ratio is better than 1/1, as it also is in timber production. Add to this a further potential superiority of the Commonwealth in fishing.

To emphasise the good showing of the Commonwealth, it should be noted that the U.S. was chosen as the comparison standard because the U.S. is easily the world's outstanding food producer. The excellent position of the Commonwealth is further enhanced by the circumstance that it is really in its industrial possibilities that the Commonwealth is outstandingly strong.

In coal, present known deposits favour the U.S. in the ratio 1/2·5. U.S. oil is more easily recovered than Commonwealth oil, and for this reason U.S. oil production stands today at a vastly higher level than Commonwealth production. It has become clear, however, in recent years that large oil deposits exist in Canada, especially in the form of oil-saturated sands. In a final total it may well turn out that the Commonwealth is not greatly inferior in its oil reserves.

More important, however, than these sources of industrial power, which in any case are sufficient to last for many centuries—come the ferrous and non-ferrous metals. In the supply of high-grade iron ore the Commonwealth is now superior to the U.S. In non-ferrous metals and other commodities the Commonwealth is also perhaps superior. This is brought out by the following lists of industrial commodity shortages.

Commodity Shortages

United States	*Commonwealth*
Antimony	Graphite
Asbestos	Mercury
Chromite	Molybdenum
Copper	Potash
Graphite	Quartz
Industrial Diamonds	Sulphur
Lead	
Manganese	

United States	*Commonwealth*
Mica	
Nickel	
Platinum	
Quartz	
Thorium	
Tin	
Tungsten	
Uranium	

It is of course the case that expansions of industry in Canada and Australia must tend to increase the list of Commonwealth shortages, but against this it must be remembered that many new deposits probably remain to be discovered in the Dominions, which have not been prospected with anything like the same thoroughness that the U.S. has.

It can be said that, of all the peoples of the Earth, the people of the British Commonwealth is favoured with perhaps the greatest undeveloped industrial resources. Apart from the in many respects antiquated industry of Great Britain, and the beginnings of industrialisation in Australia and Canada, nothing has yet been done. There is accordingly very much that we can do about extending our effective resources, and the suggestion of the present chapter is that the twenty-five or so million people in Great Britain that are now largely wasting their time should get down without more ado to the job in hand.

Now would twenty-five million people* be sufficient for the task? Under the industrial systems of the past certainly they would not have been, but with new methods of control that are fast becoming available there should be no undue difficulty. This is a point of some importance that is worth further mention.

The use of machines as a source of motive power is a basic feature of industrialism. Steam power, the earliest development, had the characteristic that the most efficient way of obtaining a substantial power supply was from one large machine, not from many small ones. This meant that it was desirable to work a whole lot of processing machinery from one steam engine. Thus in the textile industry it was desirable to work a large number of looms from one power source, rather than to have a separate steam engine for each loom. The natural corollary of this was the development of the factory system.

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*Normally distributed with respect to age and sex.

Discoveries in electricity largely reversed the situation. Since it is easy to carry electricity over a considerable distance, there is no particular reason why each processing machine should not be powered by its own electric motor. Indeed, from many points of view this is the best arrangement: different types of processing machines have different load characteristics, so that in many ways it is better to provide each one with a suitably designed motor than to have them all operated by the same power source. Thus it might have been expected that with the coming of electricity there would be a drift away from the factory system. To some extent this has happened: today many businesses are competently handled in small workshops. Even in large concerns, it is often found that work is done, not in one great room, but in many separate workshops. Nevertheless the factory system has not died out: it is more strongly entrenched today than it ever was.

The reason for this differs from the original reason that fostered the factory system. It lies no longer in the nature of the power source, but in an organisational property of the factory system. It was discovered that when a large number of people work together in some concern, it is more efficient for each man to do just one operation than to spread his activities over a wide range: by more efficient I mean that production was thereby increased. The outcome of this discovery was the mass-production system.

Mass-production brought many evils in its train. By reducing the work required from a man to some single, readily learned operation, it effectively stamped out craftsmanship. This in turn led to a deep-rooted dissatisfaction in those who worked under the system: it is from many points of view as important that a man should feel there is some one genuinely skilful activity he does uncommonly well, as that he should be given an adequate food supply. In past times it was craftsmanship that mainly provided this requirement. When craftsmanship was destroyed by the mass-production system obvious consequences arose. Men were no longer interested in their work. It became a prime concern to do as little as possible, and to seek the highest possible pay in return for it. Trade Unions developed and operated on a curiously erroneous axiom: that the 'employers' could really afford to pay unlimited high wages, and that it was only evil dispositions that prevented them from doing so.

Now what can be done about all this? For many years the mass-production system seemed inevitable to modern industrialisation. To dispense with it would enormously reduce efficiency, and in a competitive world this was not to be thought of. Thus it seemed that society had worked itself into a state where prosperity could only be achieved at the expense of a psychological deterioration in the majority of factory workers. All this is now in the process of being changed. To understand the tremendous revolution of industrial technique that is being ushered in today, it may be pointed out that the psychological deterioration associated with mass-production arises from the sheer repetitiveness of the work. The human brain is not well designed for the exact repetition of any activity that requires conscious thought. Monotony must inevitably arise, and, given sufficient monotony, general deterioration must follow. The brain is at its best when called on, not to repeat exactly a particular task, but to repeat it with slight but essential variations.

Now modern developments in electronics have reached the stage where it is possible to design an electrical machine that can control any exactly repeated activity, no matter how complicated it may be. It is possible, for example, to design an electrical machine that could control all the repeated activity of an automobile assembly works.

The above remarks bring out an important point. For long Britain has laboured under the disadvantage of an out-of-date industrial system. The most recently industrialised country naturally possesses the latest types of machinery. Great Britain, being first in the field, was outclassed in this respect by many of her later competitors. Not only this, but the industrial potential of the Dominions has lain fallow throughout the turbulent last half-century. In consequence we have been fighting a general up-hill battle in the industrial field. Now we see the opportunity to change all this. We can turn to sharp advantage the delayed industrialisation of the Dominions. We can introduce a series of new developments that go as far beyond the mass-production technique of the past—as is evidenced in the present organisation of U.S. industry—as this technique went beyond the early British industrialisation of the nineteenth century.

Thus we add to the natural resources of the Commonwealth the additional advantage of an industrialisation at a most opportune moment; of methods that avoid the psychological evils of the old mass-production system, and of industrialisation without the necessity of a large burdensome industrial population.

It is not within the province of this book to discuss in detail the properties of the new electrical machines just mentioned. The reader who is interested in this matter may like to consult an authoritative discussion by Norbert Wiener. In a recent book* Wiener shows how in principle these machines operate, he stresses their present availability, and he estimates their cost as being extremely low: the cost of a machine to control an automobile production factory being possibly as low as £1,000,000.

The Critics

A scheme of the magnitude of the one outlined above must attract criticism, and indeed it has done so. The criticisms

**The Human Use of Human Beings.* N. Wiener. Eyre & Spottiswoode.

that have been put forward are of two sorts. One type comes from professional economists who see many genuine difficulties. Such criticisms are to be welcomed, since it is much better to know where difficulties may be expected to lie before a project is started, than once it is under way. The present section is largely devoted to a discussion of criticisms of this kind.

There has been, however, a second type of criticism of a deliberately destructive kind. This has been put about by individuals whose aim it evidently is to curry favour with the Government; who, in the guise of experts, seek to excuse past and present Governments of their studied indifference to the whole matter. These people are easily dealt with. This is not a matter in which we need bandy opinion with counter-opinion; it is a matter that is open to experimental test in several ways. If Government-expert Mr. X asserts that the migration scheme is impracticable nonsense, it presumably may be concluded that Mr. X stands by the view that the methods employed during the last few years are capable of solving Great Britain's long-continued economic crisis. If Mr. X does not believe this, what right has he to condemn the migration scheme without giving it a trial? If, on the other hand, Mr. Y advocates the migration scheme, it may be assumed that Mr. Y does not believe that Great Britain can achieve economic prosperity by present methods. Thus we have a disagreement that can certainly be resolved, even if the migration scheme is not put into operation. If the judgment of Mr. X is sound, Great Britain will become prosperous again without any major reorganisation being necessary, whereas if Mr. Y is sound there will be no such return of prosperity.

There are some of us of Mr. Y's party who believe that Mr. X has already been weighed and found wanting. Many of us have been saying for the best part of the last decade that Britain's economic crisis would persist unless conditions were drastically altered, and events have so far proved our predictions to be correct. Here is the opening paragraph of a letter by F. H. Hinsley, written in 1948:

> The Economic Survey for 1948 contains much that is perfectly clear, nothing that is novel or surprising in its diagnosis of our present ills. Comment on the survey and least of all the Chancellor's broadcast of March 10th has added nothing to its outline of the grim realities. What is more important, that part devoted to the cure has been strangely neglected in the gloss of the politician and the commentary of the journalist. On the matter of the cure the Survey itself and the Chancellor's broadcast descend to their weakest and most unoriginal level. The cure they have proposed bears no relation to the admirably clear diagnosis with which we are all too familiar. It is no exaggeration to say that it is not a cure at all. It is a muddle of pious hopes and desperate incantations.

To finish with Mr. X, it is now nearing the time when he should be obliged to explain himself; instead of his being afforded the luxury of scorning the suggestions of other people, the time is surely coming when he should be forced to tell us why his own predictions have had such a miserable lack of success. From now on, as Britain staggers from one crisis to another, Mr. X is going to find himself in an increasingly uncomfortable position.

It is often said that the migration scheme demands that the young people should move to the Dominions, leaving the older people behind. It demands nothing of the sort. The people to go abroad are quite easily defined, they are simply the twenty-five million people that can best be spared without imperilling the productivity of Great Britain. Put into the simplest of terms, people in Great Britain can be divided into two rough categories, productive workers and non-productive workers: the productive workers and their families stay, the non-productive workers and their families go. We have seen that Great Britain is overloaded by upwards of 25 million people. It is those who can best be described as the overload that must go. The full productivity of Great Britain must be kept up at all costs during the actual migration, and this certainly could not be achieved if our industrial populations were moved abroad.

At this stage it may be emphasised that no moral implications should be attached to the designations 'productive worker' and 'non-productive worker'. There is no occasion for the productive worker to feel any glow of moral virtue or for the non-productive worker to feel a sense of moral obliquity: I say this as a non-productive person myself. Our particular positions in society depend largely on the environments in which we happened to grow up, and no blame can be attached to any of the 25 million who form the population *overload* of Great Britain. This overload was a product of complacent Victorian Britain. The blame must be attached there, not to us—if such a procedure should give any satisfaction. The only moral issue that might possibly arise would be if a non-productive person were to dismiss the whole question from mind, simply because he found it distasteful.

Another criticism that may now be answered is this: if by and large British industrial workers are not to be moved abroad, how could the industrialisation of Canada and Australia be effected? Surely the experience of British industrial workers would be essential? One would be obliged to agree that this would be a serious objection, if industrialisation were to proceed by present-day methods; but, as we have seen, it is desirable to proceed by introducing entirely new methods of electrical control. It will be necessary for new techniques to be learned and this could very nearly be as well done by people who are now in the non-productive category as by those trained in the old-fashioned methods; possibly better, since those now without industrial experience would have the advantage of starting without preconceived prejudices.

At this stage it is necessary to consider quantitative issues. It has been variously estimated that the cost of large-scale emigration lies between £2,000 and £5,000 per head. Thus the 'cost' of a migration of a million persons per year would be a tremendous total somewhere between £2,000 m. and £5,000 m. annually. Before, however, we commit the error of asking where this money is to come from, let us examine the reason why capital is necessary for the establishment of a new commercial enterprise.

As an example, suppose that I decided that there would be an enormous market for collapsible rolling-pins. What procedure should I adopt in order to pursue the matter further? I could write pamphlets urging their advantages, in the hope that society in general would come to regard their production as a matter of urgency and would accordingly come to do something about it. But if this failed to stimulate the hoped-for effect, as it very likely would, what other line could I follow? I could try to raise capital. Suppose in some way I managed to obtain £1 m. Then whether society wanted it or not—Ministry of Works licences apart—I could build my rolling-pin factory, since I could make it sufficiently profitable for some contractor to do the building for me. Similarly by paying good wages I could get people to work for me; again whatever their private opinion of the rolling-pin project happened to be. Hence I could produce my collapsible rolling-pins, and finally I could find out by the acid test of experience whether or not there really was an enormous market for them.

This case brings out the very nature of capitalistic enterprise. Money provides a means of making society do, within wide limits, what you want it to do; and this even if society has no real desire to fall in with your plan. Money provides a form of blackmail that you can use to make society do certain things that it otherwise would not do. By and large this is the business man's idea of capital.

Now we reach a crucial point. If, on the other hand, the whole of society is firmly determined on a course of action, then it does not necessarily have to stop off to raise money; it can simply get on with the job in hand. Stone-age man did not need to raise enormous sums before he could get on with the development of the Earth's resources. The present assets of the U.S. did not have to be raised by the early settlers. Provided adequate resources are available capital can simply be created by the determined efforts of the whole people; it does not have to be raised; and this is the situation with our migration scheme. If the British peoples as a whole become determined on this scheme, the resources being there in plenty, nothing can stop them. Only their own labours are needed.

What then does the figure of £2,000 m. or £5,000 m. per year mean? Certainly it does not mean that money must be conjured up at this rate before the scheme could be put into operation. These estimates do nevertheless have an important value; they give a measure of the amount of effort that would be necessary to set the plan into operation. There is here a close parallel to what happens during a war. War preparations and actual military operations do not necessarily have to wait on the raising of money, once the people have decided that they are going to fight. What then does it mean to say that the cost to Great Britain of fighting the late war amounted to about £5,000 m. per year? Simply that this was an estimate of the personal effort of the British people; of the amount of their labour; of the raw materials wasted by the war; and of the deterioration of industrial plant. In a like manner our estimate of £2,000 m. to £5,000 m. per year represents an estimate of the effort that would be required if the migration scheme were put into operation. If we take the upper limit of £5,000 m. per year, then we see that the project involves approximately the same degree of determined economic effort as is demanded by a major war. This sets the whole matter into a proper relief; it shows that the solution to our present difficulties is not a cheap one; it is a solution that can be arrived at only with very great effort.

In addition to an estimation of the strain of the emigration scheme in any one year, we may also ask how long would the strain last? Would it last for the twenty-five years or so that would be required to complete the transfer of Britain's excess population? Without wishing to maintain that the strain would be entirely removed in the later stages of the plan, it must be recognised that the early developments would be the most difficult. After ten years, say, the early developments would already be bearing fruit. That is to say, the productivity of the Commonwealth would be rising, and the increase could be used to offset further developments: once well under way, the scheme would create its own 'capital' as it went along. It is therefore quite wrong to suppose that a strain equivalent to £5,000 m. per year would continue for as long as twenty-five years. Perhaps it would be fair to say that the full effort required by the scheme is economically equivalent to about ten years of modern war. This is a measure of what is involved, and the reader will see that it is no light measure. The enterprise is a severe one, and this should not be concealed.

Now it will be asked: who is going to supply this great effort? The answer to this is a straight one: the people of Great Britain. It is we who have got into a mess and it is we who must get out of it. By the greatest of good fortune the Dominions are available to absorb Britain's excess population, possessing as they do large undeveloped resources. By equal good fortune Canada and Australia are in any case intent on programmes of industrialisation. The Australians in particular realise that their future safety, in the face of the nationalistic, swelling peoples of Eastern Asia, depends vitally on the development of a strong industry. But neither the Australians nor the Canadians can be expected to bear the main sacrifices. If Great Britain is willing to supply the energy and labour for increasing Canadian and Australian prosperity, then the scheme can be made to work, and not otherwise. Great Britain can supply something else besides sheer labour. We have seen that the scheme provides an opportunity for a large forward stride in industrial methods, by the use of electrical control for the entire direction of repetitive processes. To effect this great stride a highly skilled electronic technology is required. As a result of pioneer work in radar during the late war, Britain has built up this skill; no other country except the U.S. is our equal in this matter. Here we have another extremely valuable contribution to throw into the kitty.

Now it may be asked: how can Great Britain manage to shoulder the main burden of the industrialisation of the Dominions when she cannot even support herself as it is? The answer is partly that a large effort could be supplied by the 25 million overload of population, and partly that the British people would have of necessity to accept a temporary lowering of their standard of living. By a temporary lowering of the standard of living I do not mean a reduction of food supplies, but simply that all production would have to go to those things that were necessary to the furtherance of the general plan, not into the production of luxury articles. This situation is of course already familiar to us, since we experienced it during the late war.

Surely, it will be said, you cannot expect people to voluntarily accept a reduction in their living standards? In answer to this it may be said that if the reduction is not voluntarily accepted it will have to be accepted as a matter of force. We can voluntarily accept a sharp reduction now, in order that the standard may rise greatly in about a generation's time, or alternatively we shall certainly suffer a steady reduction that will force us inexorably down, and ever down, to lower and lower levels.

To make a personal statement, it has always seemed to me that what is physically possible can be done, what is physically impossible cannot be done. It is, I believe, physically impossible for Great Britain to save herself by the methods at present in use; it is, I believe, physically possible not only for Great Britain to save herself by the migration plan but at the same time for the British Commonwealth to make itself into one of the most powerful combinations in the world. The fact that psychologically the situation is the other way round, that at present the British people do not want to bother, that they 'couldn't care less', does not greatly impress me. The psychological attitude of a people can be changed, a physical situation cannot. In any case I am sure that it is much easier to change the outlook of people than is generally supposed. Indeed I am not nearly so worried about the difficulty of the British being persuaded to throw off their present 'rigor mortis' as about the danger of a marked increase in the total population of the whole Commonwealth.

Thus if the migration scheme were fully carried out, there would in about thirty years' time be a marked tendency for the standard of living to rise. All our efforts would be wasted if this were simply swallowed up by an increase of population. There is no point in the present generation making a great sacrifice if the reward is to be squandered by the stupidity of a future generation; just as the reward of the first industrialisation was squandered by our forefathers.

A Strategic Argument

Let us indulge in a little make-believe. I am going to cast the reader in the rôle of some sinister foreign air-force leader, whose job we imagine it to be to organise the 'strategic' bombing of Great Britain. For my part I shall play the part of an equally sinister junior officer whom we suppose to have been told off to draw up a plan of action. To set the stage, let us suppose that war with Great Britain has just been declared—or decided on. Our side we will suppose to possess several thousand atomic bombs, and a large number of fast planes with which to deliver them. Here now is my plan:

'Restraint is its essence. Instead of dropping the forty or fifty bombs that would ensure the obliteration of London, and dropping the odd score of bombs that would also ensure the total destruction of the other principal British cities, I propose that bombs be used very sparingly. Thus, if we entirely destroy the whole of London and the other cities this can only be an advantage to the British; it will mean that they will have fewer people to feed. Moreover, an utter destruction of London would still allow the rest of the country to function in a more or less normal manner. In particular, the American air bases in Britain would be left to continue their operations against our glorious Fatherland. If, on the other hand, we deliberately destroyed only a fraction of the large city populations of Great Britain, the remainder can be depended on to stream out of the towns into the comparative security of the countryside, thereby exercising a paralysing influence on the whole social organisation of Great Britain.

'To be precise, I propose that to begin with we drop five atom bombs on London, killing perhaps a quarter of a million inhabitants. So swift will this disaster seem to the rest, so much will it be outside anything they have ever experienced, that we may expect utter panic to ensue. Millions of people will attempt to stream into safety outside the city. The normal British transport system will be quite unable to cope with such numbers. Consequently there will be a completely disorganised exodus. We shall add to the general panic by dropping large numbers of napalm bombs on the fleeing refugees; not primarily, I would emphasise, to kill, so much as to disorganise. Every person we leave alive will increase the chaos, once we have reduced Britain to a state of utter disorganisation.

'It is my belief that the authorities will lose control over the enormous mass of shifting population. London alone will supply the huge total of seven million refugees; the other large cities can be made to double this number. We shall, therefore, have something like fifteen million people, stark mad with terror, behaving like wild animals trying to get away from a forest fire. The police will have negligible restraining influence over them, since a police force can only preserve order if the great majority of the people adhere to the normal social conventions. To put this more precisely, the British police find it difficult to cope with a crime wave involving only a few thousand criminals; how then will they be able to keep fifteen million crazed people in order?

'Next, how will the refugees manage to feed themselves? The very panic will throw the normal food distribution system hopelessly out of gear, so that the only way in which the refugees can keep themselves alive will be by seizing all the food they can from the country people. There will be mob law throughout the countryside. The spirit will be that of every man for himself: one cannot expect normal polite conventions to persist when a quarter of a million people in one city have been exterminated in a single hour.

'The disorganisation of the countryside will reduce Britain's already inadequate food production to a still smaller level. We shall add to the food difficulty by the systematic atom bombing of all Britain's main ports, making it well-nigh impossible for the importation of food to continue. Then it will not take long before the whole of Britain becomes infested with a huge, unstable, constantly moving mass of starved, crazy people, all of whom will be seeking to keep themselves alive by pillage and murder.

'Panic and irrational rage are emotions that go together. At an early stage it is to be expected that the terror-stricken people will start searching for something on which to vent their spite; looking for someone whom they can blame for all their misfortunes. What is more natural than that the Americans will be seized as the scapegoats? Besides, the Americans will have food, and that will be sufficient to attract the starving mob. This means that the Americans will be obliged to defend themselves, a well-nigh hopeless proposition in view of the disparity of numbers. It can perhaps be said against this that the Americans will try to fly large numbers of their own troops into Britain, but then we should be treated to the amusing spectacle of America engaged in a war against her own ally! It would be a war in which the hysterical British would be driven ever onwards by the pangs of hunger: the Americans would not find it easy to cope with this. Indeed the American use of Great Britain as an air base is certain to be very largely neutralised by these tactics'.

Let us now stop this grim recital, by asking just how much of it is, in fact, make-belief? Certainly the reader's rôle and my own are imaginary, but is the rest really not a pretty accurate description of what will happen if Great Britain ever finds herself in an atom war? To answer this we may ask: what could prevent a sequence of events of the sort just described from occurring? If no precautions were taken, this, I believe, is exactly what would happen. But what precautions could be taken? What is the chance of air-defence being able to prevent atom bombs from being dropped on Great Britain? Very little indeed. The jet engine has greatly reduced the margin of speed of fighter aircraft over the bomber. So there is little reason to suppose that enemy bombers could be intercepted before they reached our cities. It must be remembered in this connection that interception to be effective must be 100% efficient; only five bombers are required to get through to effect the terrorisation of London; only one bomber for our other cities. Nor can anti-aircraft fire afford us much comfort, even in these days of guided missiles. The target area for atomic bombardment is so large, especially in the case of London, that bomber aircraft would be able to fly at very great heights, thereby reducing the efficiency of anti-aircraft fire and also decreasing the chance of interception.

Is the argument wrong in supposing that a would-be enemy might possess a large number of atomic bombs? By way of answer to this I propose to quote from an article that I wrote some time ago. The argument is somewhat technical, but I think that on this particular issue technicalities are not to be avoided*.

"I shall mainly be discussing nuclear reactors in which the fuel is ordinary uranium; the energy supply being provided by U–235, which forms about one part in 140 of ordinary uranium. Each fission of a U–235 atom produces on the average about two and a half neutrons. Of these, one neutron is required to keep the fission chain going. The remaining one and a half provides a supply of free neutrons, some of which are lost from the system, the others reacting with U–238 to produce

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*Taken from the *Atomic Scientists' News*. Certain estimates have been revised in the present text, with particular reference to the efficiency of explosion of the bombs.

Pu–239 eventually. In all except the very last of my remarks the phrase 'production of fissile material' is to be understood as meaning the production of this Pu–239.

"In the first two-thirds of this article, I shall be concerned with the case where Pu–239 is removed from the reactor as soon as it appears. That is to say, we suppose that it does not remain long enough in the reactor to itself undergo fission. The number of grams of Pu–239 produced in this way for every gram of U–235 consumed will be denoted by the parameter β. In the slow production reactors of the present day it would seem that β is close to, but less than, unity. Accordingly, the amount of Pu–239 obtained from these reactors should be closely comparable with the amount of U–235 fed into them.

"To proceed further we must consider a particular reactor. The Hanford plant is an obvious choice, as it is the only production reactor for which any information seems to be available. The rated output is about 1000 mw., and since this power is derived from the fission of U–235, it is easy to calculate that the U–235 consumption must be about 0·36 tons per year. Thus the rate of formation of Pu–239 must also be about 0·36 tons per year, assuming the recovery of Pu–239 to be complete.

"The bomb question may be introduced at this stage by enquiring how much Pu–239 is required to make one bomb. For this purpose it is convenient to argue that a uranium bomb has about the same explosive power as 20,000 tons of T.N.T. Now it is readily calculated that the energy released by the total combustion of 20,000 tons of T.N.T., is equal to the energy that would be produced in the fission of about 3·6 kg. of Pu–239. The bomb content of Pu–239 is probably considerably greater than this, however, since it seems that the consumption of fissile material in an explosion cannot be anything like complete. To make what appears an adequate allowance for incomplete consumption, I shall adopt throughout the following discussion 36 kg. for the amount of Pu–239 per bomb. With this value our estimate for the bomb production of the Hanford reactor comes to the round figure of 10 per year.

"Next we ask: how many plutonium production reactors are likely to be in operation at present, and in the near future? A lead on this may be got by asking the further question: what is the factor that must ultimately limit the building of large numbers of these reactors? Certainly neither expense nor a lack of priority can be the limiting factor; it seems clear that the cost of a production reactor cannot greatly exceed the approximate figure of £25,000,000, which is negligible compared with the sums that many nations are anxious to spend on their defence programmes. Thus the limiting factor would appear to be simply the rate at which uranium ore is dug out of the ground and refined into pure metal. That this is indeed the crucial factor is confirmed by the complete absence of information concerning present uranium production. Zimmermann in his excellent treatise *World Resources and Industries* discusses in detail the mining rates of various metals, but all mention of uranium is significantly omitted. The pre-war production of uranium oxide would appear to have been in the neighbourhood of 1,000 tons per year. It seems probable that present production of uranium metal is substantially greater than this; perhaps a rate of 3,000 tons per year would not be an undue estimate. The amount of U–235 contained in 3,000 tons of ordinary uranium is rather more than 20 tons. Thus, remembering that the Hanford plant consumes about 0·36 tons of U–235 per year, we see *that a uranium-refining capacity of 3,000 tons per year would* supply enough fuel for about 60 reactors of the Hanford type; or for a correspondingly smaller number of reactors of larger power output.

"Judging as best I can from inadequate data, my opinion is that the number of reactors so far constructed has not yet reached this total. Estimates of expenditure for the period 1952–54 leave little doubt, however, that by 1955 plutonium production will be in full swing at a rate commensurate with the total uranium-refining capacity. Thus we anticipate that in the near future the production rate of fissile material will rise to about 20 tons per year, which would be sufficient to provide for an annual manufacture of 600 bombs; assuming, of course, the above estimate of 36kg. of Pu-239 per bomb.

"Consider now the economics of extermination. The annual cost of servicing the sixty or so reactors referred to above, and of constructing replacement reactors, might be as great as £150 m. per year. Thus if each bomb is taken as having a killing capacity of 25,000 persons, it follows that an extermination of $1{\cdot}5 \times 10^7$ people could be achieved at a cost of £$1{\cdot}5 \times 10^8$; which works out at a round figure of £10 a head. This latter estimate should not be quoted too precisely, however, since the supply of human material would very likely run out before all the bombs could be used. Nevertheless, it is clear that the uranium bomb provides us with a grotesquely cheap means of extermination; for comparison, the killing cost during the late war was as expensive as several thousand pounds per person.

"We pass on now to further scientific considerations. Instead of the Pu-239 being removed from the reactor as soon as it is formed, let it remain *in situ*. What happens then depends very sensitively on the parameter β (1 gr. of U-235 produces β gr. of Pu-239). If $\beta<1$, no pure fissile material is obtained from the reactor, but for a fixed power output and for a given fuel charge, it can readily be shown that the lifetime of the reactor is increased by the factor $(1-\beta)^{-1}$. As another conjecture, I would suggest that in present-day reactors β is close to $0{\cdot}9$, so that the extension of lifetime can be very considerable: a situation of great importance in the economics of steady energy generation.

"If, on the other hand, $\beta > 1$, pure fissile material can ultimately be recovered from the reactor. A simple calculation indicates that the quantity of this fissile material amounts approximately to a fraction $\beta - 1$ of the initial supply of U-238. This is of no small importance. Thus in our previous calculations the Pu-239 recovery was but a fraction 1/140 of the initial amount of U–238; now we have the fraction $\beta - 1$. Since, moreover, it seems theoretically possible that β might eventually be made as high as 1·1, the reactors of the future may well be far more efficient producers of fissile material than anything we have discussed so far. Thus, assuming the case $\beta = 1{\cdot}1$, we see that the amount of fissile material produced might be as great as 1/10 of the total uranium-refining capacity. Retaining the estimate of 3,000 tons per year for this, the fissile material production amounts to about 300 tons per year: sufficient for an annual manufacture of 9,000 bombs.[*]

"Nor is this the end of the matter. Suppose next that a quantity of Th–232 is introduced into a reactor. Then the absorption of free neutrons by the Th–232 leads eventually to the formation of U–233, which is also fissile. Let 1 gr. of initial fissile material produce γ gr. of U–233. Now should it be found possible to make $\gamma > 1$, the amount of U–233 produced would be a fraction $\gamma - 1$ of the initial supply of Th–232. The importance of this arises from the fact that thorium is a more easily mined element than uranium: one could imagine production of pure thorium at a rate, say, of 20,000 tons per year. It follows, therefore, that if $\gamma = 1{\cdot}1$ could be attained, the amount of fissile material produced might be as high as 2,000 tons per year: sufficient for 60,000 bombs.

"Finally, a little more extermination economics. Without substantially increased costs the bomb production has now swollen a hundredfold. Thus if we again assume an extermination rate of 25,000 per bomb, the killing cost is reduced to about two shillings a head—man, woman, and child. The reader should not become too enthusiastic about this, however. He should not see in it the possibility of a drastic reduction of defence expenditure, and hence of the taxes he is called on to pay, since the calculation is based on a fallacy; the fallacy of a supply of human material sufficient to give full employment to 60,000, bombs per year. To emphasise this, the calculation leading to the cut rate of two shillings a head demands the extermination of $1{\cdot}5 \times 10^9$ persons per year: not even the countries of far-eastern Asia could supply subjects at this rate; nor could guinea-pigs."

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[*] It has been reported in the U.S. that the case $\beta > 1$ has been achieved.

An obvious conclusion to be drawn from this article is that in the near future there will be no shortage of atomic bombs: everybody will have them. This is a point that scientists have been trying to stress for the last seven years. As there is no intrinsic difficulty in producing atomic bombs, in the long run there can be no such thing as secrecy. One nation may manage to get a few years start of another, but what does this matter once the number of bombs that everyone has got runs into many thousands? Is it going to be an enormous advantage to the U.S. to possess 10,000 bombs when the U.S.S.R. possesses only 3,000?

Indeed while politicians have been pursuing the chimera of secrecy, they seem to have missed what is really the crucial point about atomic weapons: namely that their possession is not the main issue, the important factor is the means of delivering them. The nation that possesses the best aircraft is likely to be more dangerous than the nation with the biggest stockpile of bombs. The sale of the Nene and Derwent jet engines should be viewed in this context. Moreover, to add to the foolish blunder over these engines, the present Government is now engaging to sell abroad later types of jet plane. Since there is some reason to believe that Britain possesses jet planes of a high class, this step should immediately be revoked. It will, of course, be said that the planes are only to be sold to our allies. This is rather like a man excusing himself for a breach of confidence by saying that it was only to his friends that he divulged the vital information.

Returning now to our unsavoury subject, we may ask: what preparations would certainly prevent Great Britain being entirely destroyed as a coherent nation by the first breath of atomic warfare? The answer is plain: if there were no large cities to bomb. This is the one and only effective preparation that can be made. Now, where are the city people to be moved? Our answer is that these are very largely the people that in the migration scheme would be moved abroad to the Dominions—

there is certainly nowhere else that they could effectively be moved to. It is sometimes objected that it would be difficult to persuade people to go abroad. I wonder if it will be so difficult once people have begun to appreciate what their fate is otherwise likely to be.

Perhaps it may be said by a despairing critic that this is not such a strong argument as it may seem, because after all there may never be another war. No? Well, what has all the trouble of the last few years been about? Why are Great Britain and the U.S. arming themselves as fast as they can go? Does this look like the expression of confidence in there never being another war? Does the war in Korea encourage the view that there will never be another war?

Then perhaps another critic will turn the argument inside out by saying: why bother with the migration scheme, since it will take about twenty-five years to carry it out, and war may happen long before this? It is of course possible that war might interrupt the scheme, and that through some sequence of events like that imagined above the scheme might be prevented from ever being brought to fruition. This is a risk that must be taken. An Englishman visiting North Africa who refused to take precautions against dysentery on the ground that he might die of heart failure would justly be set down as a fool; and our critic's argument hardly entitles him to any other description.

In the next chapter I hope to show that if Great Britain plays her cards properly there is indeed a very reasonable chance that twenty-five years' grace might be obtained. This whole matter of warfare is, of course, a reminder that the British Commonwealth is not alone in the world. To a considerable extent the problems of the world are our problems too, and this is why I propose to go on to discuss things on a wider view in the next chapter.

The recognition that external events may possibly interfere with the scheme put forward in this chapter is one of the reasons that underlie all those of my remarks that have been directed against post-war British Governments. It is now seven years since the war ended and these seven years could have been a part of the necessary twenty-five years' breathing space, leaving only eighteen to go. Not only have our Governments spent seven years in futile trifling with an intractable economic situation, but the very safety of the people has been imperilled, to the extent of a loss of seven years in which a substantially more reassuring position might already have been reached. Indeed, when we turn to the question of national security a far more ridiculous situation is revealed even than in economic matters. We now have a rearmament programme. We have N.A.T.O. We have atom bombs and up-to-date aircraft in which to carry them. But of what avail is all this when our cities are defenceless? All that we ourselves have been offered by way of a personal defence against atomic bombardment would seem to be Sir John Anderson's brown paper bags, brown paper bags in which we are supposed to place our heads: a course of action that might well commend itself to our politicians, who seem to spend most of their existence with heads immersed in metaphorical paper bags.

My present outspokenness is directed by a consciousness of how much is at stake. As I see it, a continuation of present policies must lead in the first place to a persistent economic deterioration and, secondly, should war eventually overtake us, to an entire blotting out of Britain as a nation. When in the previous chapter I referred to the falls ahead, it was this that I had in mind.

It will be recalled that I also said that it is still possible to find a branch stream that avoids the falls. This is the migration scheme. The migration scheme is not a soft option; it would require hard work for little immediate reward, both to those who would stay in Britain and to those who would go abroad. But the eventual rewards would, I think, be more than worthwhile, amounting both to general economic prosperity throughout the Commonwealth—equipped as it would be with the very newest industrial devices, many years ahead of any competitor in their design—and to the economic recovery and physical security of Great Britain. With a population of 20 to 25 millions only, Great Britain could avoid being overwhelmed by an atomic war. Without the present enormous overswollen cities, it would be possible for the townspeople, if the worst should happen, to take a genuine refuge in the country. But this is not all: with Commonwealth industrialisation in support, Great Britain could be a very ugly customer to tackle. In contrast, aggressor nations are likely to be encouraged by Britain's present weakness. It will become known throughout the world—if it is not already known—that Britain dare not risk war, and everyone will gradually come to trade on the fact. The outcome will be a hopeless decline of British morale, as indeed it has already begun to decline, and ultimately we shall come to be kicked around by half the nations of the Earth. These are the issues before us. It is up to each one of us to make his choice.

CHAPTER III

Bedrock

> 'All that need be said of the Huns is that they were unbelievably beastly.'

The Big Bad Bear

It is commonplace to read in the daily papers that the great issue facing us today is the conflict between Communism and the Free World. Perhaps we should start this chapter by enquiring into just what this conflict consists of. What is Communism, and why is it so rootedly opposed to the social organisations of the Free World?

As a first step it may be said that Communism and Capitalism are rather like the negative and positive of the same photograph. In capitalistic society the great bulk of property and industry is owned by individuals and the 'State' is supported by taxes raised on private companies and on individuals. In communistic society things are just the other way round; effectively all property and industry is owned by the 'State', and individuals are rewarded for their work at the pleasure of the 'State'.

There is nothing in this to provide an immediately sensible reason why two societies adopting such opposite social organisations should be at each other's throats; any more than there was a sensible reason why Swift's Lilliputians should have risen in revolt against the practice of Littlendianism. Even when we look deeper into the matter it does not become easy to detect a sound reason for hostility. This, I hope, will become plain in the following discussion.

There are appreciable numbers of people living in capitalistic societies who express themselves as favouring the communistic type of organisation. They say that Capitalism is 'unfair', that it sustains the so-called privileged classes. This is certainly true. In an economic free-for-all, which is what Capitalism amounts to, it is certain that some individuals will come out of the mix-up better than others. Special abilities may play a part, but even without differences of ability chance fluctuations would eventually lead to some people becoming much wealthier than the average. According to the people who favour Communism there is something immoral about this inequality.

Now does the communistic form of society really provide equality for all? Of course it does not. This we can see by enquiring into the so-far undefined concept of 'State'. What is the 'State'? In one sense it is the whole mass of a people, and in another sense it is no more than the individuals who happen to form the governing group. In the present discussion it is the latter interpretation that is of interest. The persons who govern, control all property in a communistic State. Do these people also take an equal share? Naturally they do not. They are the equivalent of the privileged class in capitalistic society. Indeed a leader in a communist society is far more privileged than any capitalist could ever be. A capitalist at most controls only a fraction of an industry—the influence of even a Rockefeller is limited—but a small group of communist leaders control everything. They possess the whole of industry, and they possess the physical power to dictate to the people what level of reward they must work for. No capitalist possesses any semblance of this latter power, hemmed in, as he is, by Trade Union activity. What it amounts to is this: in a capitalist society there is a large group of people possessing a limited degree of privilege. Whether a particular individual belongs to this group or not is largely a matter of chance. In a communistic society there is a perhaps smaller privileged class, but what this class lacks in numbers it makes up in the very high degree of its privilege.

All this is so obvious as to make one wonder how anybody could be naïve enough to put forward the 'fair shares' argument as a basis for favouring Communism. Actually, not everyone using this argument really believes it. Those who do believe it usually describe themselves as Socialists, while those who use the argument but without believing in it are the communists. This is a distinction worth emphasising at the expense of a diversion.

The communist living in a capitalist society advances the 'fair share' argument because he thinks that by railing against the present privileged class he will persuade the bulk of people to favour a change over to Communism. Should this happen he hopes to become a member of the fantastically privileged class that will rule the new State. Thus a communist is nearly always one who sees a change-over to Communism as a cheap way of obtaining what he covets. The communist is rather like a chess-player who knocks over the board as soon as he finds that the game is lost.

Not all Socialists are activated by such personal motives. Many Socialists have themselves come from the privileged class. These have invariably been people who came to be obsessed with the moral implications of the 'fair share' argument. Muddle-headedness underlies their statements and policies. Thus in the early days of Socialism it was believed that by taking over the possessions of the privileged classes and by distributing them equally all round the general standard of living could appreciably be raised. But, in Britain at least, the really privileged classes possess only a few per cent of the total wealth*, and hence even if the possessions of the wealthy were shared out equally there would be only a negligible

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*A Socialist will probably feel disposed to deny that the privileged classes obtain as little as a few per cent of the national productivity. Socialist propaganda arrives at a contrary conclusion through attributing all variability of income to privilege. This is fallacious, however, since some variability must arise from the differing quality of work provided by different individuals. This is a feature of the social organisation of communist Russia, every bit as much as it is of the British social organisation. I imagine that no Socialist M.P. believes that he should receive only as much as a cinema usherette.

The question is, therefore, at what level of income may privilege be said to arise? As a somewhat arbitrary, but not unreasonable, criterion change in the lot of the average man. In spite of this there are still innocents in the L.P. who believe that endless wealth can be raised by a 'soak-the-rich' policy.

To come to more rational considerations, if the aim be a raising of the standard of living, the proper procedure should be to investigate the factors that control it, not to rush into crack-brained schemes of the sort just described. Now it is not at all difficult to see that the average standard of life is determined by dividing the productivity of a country by the number of its inhabitants. The society that manages to make this ratio largest will have the best standard of life, quite apart from how it elects to parcel out a few per cent of the total wealth among a small privileged class.

When this point had eventually been dinned into the British Socialists, they asserted, giving as little thought to the matter as they had formerly done, that a communist form of State would yield the higher standard of productivity. This was an amazing assertion in view of the fact that the U.S., organised on capitalistic lines, shows far and away the world's highest

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I would suggest that serious issues of privilege only arise at income levels greater than £2000 per year. Certainly the great majority of people receiving smaller incomes might justly claim to be paid in accordance with their 'worth' to the community.

Then we have the following situation, applicable to the year 1950: *before* tax, incomes greater than £2000 per year comprise about 10% of the total income of all classes; *after* tax, such incomes comprise about 6% of the net total income of all classes.

I am, I believe, being very fair to the popular socialistic outlook in these remarks. It has always been my impression that when a Socialist speaks about the 'rich' he has incomes very much higher than £2000 per year in mind—after all, an income of £2000 per year to-day is only the equivalent of about £250 per year before the first world war. Thus an income of £10,000 per year would seem to correspond better to the notion of 'richness'. For this case the estimates are: *before* tax, about one income in 1300 exceeds £10,000 per year; *before* tax, incomes greater than £10,000 per year comprise about 2% of the total income of all classes; *after* tax, incomes greater than £10,000 comprise about ½% of the net total income of all classes.

Privilege in Britain is accordingly on a very small scale. Even if we were to set the level of privilege as low as £1000 per year, incomes higher than this, *after* tax, only comprise about 14% of the net total income of all classes.

These statements are based on statistics issued by the Treasury.

level of efficiency. It is true that special reasons can be put forward to explain this away, but the very fact that it is necessary to explain it away exposes the negligible grounds on which Socialists make their assertions. Where is the communist State whose productivity demonstrates their proposition?

Although I think one must accept the view that the evidence on this issue is still inconclusive, it seems on psychological grounds that, other things being equal, Capitalism is likely to excel Communism in fertility of invention and in general productivity. Thus it is of the essence of Capitalism that those who employ inefficient methods do not tend to survive. It is true that examples can be found of restrictive practices, and of the refusal to put new discoveries into operation; but these cases are exceptions rather than the rule, and they occur precisely in very large concerns that possess practically a monopoly in a particular field. How much more would such practices occur when there was only one firm, namely the 'State'? Not only this, but in a communist society those who control the 'State' have as their prime concern, not the efficiency of industry, but the preservation of their own power. In a capitalist society, on the other hand, by and large, efficiency comes first.

So far, then, we have seen nothing to show why a capitalist State should object to, and should be alarmed by, Communism as such. If anything, it would seem from what has just been said that the capitalist States ought to be congratulating themselves on possessing the better system, and ought to pity the others rather than be angry with them. 'Ah, yes', it may be said, 'but this leaves out of account the communist (not Socialist) aim to change Capitalism to Communism by violent revolution. It leaves out of account the fact that the communist States are deliberately trying to bring a revolution about.' Such an argument cannot be given serious countenance, however. How much success has the U.S.S.R. had in promoting a communist revolution in Great Britain or in the U.S.? 'But how about the case of France?' it may be asked. Very well, consider the case of France. The essential feature here is that the French Communist Party is a strong party quite regardless of the activities of the U.S.S.R. Ever since the days of the Paris Commune the French have had many people with communist leanings. It was from the Paris Commune that the system takes its name. The Paris Commune preceded the Russian October Revolution by nearly 50 years. It would be more appropriate to put the matter the other way round; to say that the French have profoundly influenced the Russians, not vice versa.

What then are all the capitalist objections to Communism? 'Enough!' it will be said; 'we all know that Communism brings unspeakable horrors in its path. How otherwise can one account for the slave-labour camps of communist Russia? Is it not quite sufficient to fight Communism on moral grounds alone?' This is a matter that deserves close consideration.

To begin with, here is a counter-question: are we certain that the system of slave labour in Russia is a product of Communism and not of Russianism? Or, to turn the argument to a different point, why is there no open slavery in the Free World? The conventional answer is, of course, because in the Free World we believe slavery to be morally wrong. Presumably it would be said that such a view is based on Christianity. Yes? Then why did it take Christianity eighteen hundred years to make its moral teaching felt in this respect? Is it not a coincidence that slavery did not die out in the Free World until slavery was no longer of considerable economic importance? One might say that a more accurate description of the end of slavery was this: so long as slavery was economically important, Christian consciences were powerless to stop it; but once scientific inventions had produced machines that largely dispensed with human muscle power, and slavery was no longer of any real economic significance, Christian consciences were at last able to assert themselves. Even this small rôle was not executed with much despatch. Even well into the machine age we find an effective form of slavery—not, it is true, of the bought-in-the-market variety, but slavery none the less.

A hundred years ago young children were made to work many hours a day in the Yorkshire woollen mills. This form of slavery, forced on the children by their parents—with due respect to their consciences, was in many ways more horrible than the more graphic forms of slavery practised in the ancient Mediterranean world: the graveyards of the time certainly testify to extremely lethal effects. Now, it is of interest that when protests against the employment of young children ultimately attained important proportions those who defended the practice maintained it be *an economic necessity.* Exactly the same argument was used by Plato, when, deploring the fact that outright slavery had assumed such enormous proportions in the Greek State, he condoned it as an unfortunate economic necessity. When confronted by the economic argument, Ben Preston, a nineteenth-century Yorkshire poet, was moved to write the following ironic poem in his native dialect:

It wor misty an' frosty an' dark as a booit,
An' soa cowd ye'd ha'e pitied a toad,
When ah eeard to me thinkin' a leet little fooit,
Pit-pattin' behint ma on t'road.

Nah, at five ur awf-past, ov a cowd winter morn,
Ah'd noa thowts ov a comrade at all,
So ah stude whol thear coom up a bit ov a barn,
Like a peggy-stick airin' a shawl.

"Hollou, lass," ah said, as I tapt hur o' t'crahn,
"Tha'll be doin for i' t'river ur t'kiln.
Whot are ta, yo' monkey, an' wheer are ta bahn?"
Says shoo, "A short-timer to t'miln."

"If that maister o' thine's onny childer," ah said,
"Ah sud like 'em to march at thy back;
Bud, ah guess, it tha'd laid an ahr longur i' bed
'At trade 'ud begin to be slack."

"Hay! maister," shoo said, "ah've eeard t' governer sweear
'At he's made nowt by t'trade for this age,
An' his horses an' carriages nips him so bare
Whol he 'ardly can thoil to gie wage.

"Then he's bowt an istaat, an' he's beeldin' a hahse,
Ey! an' t'cost on't no mortal knaws yit,
If we pinch whol wer cubbords weant pastor a mahse
He can nobbud just stand on his fit.

"He says furriners latly hes made a gurt spring,
'An they live on chopt cabbage an' saam;
Soa it hoins him, ye see, to shut brass like a king,
'An then sell i' t'same markets wi' thame.

"If we doan't work for little, we moan't work at all,
An' my gronfathur said yusterneet
If it worn't for t' short-timers 'at t'system 'ud fall,
An' t'plewshare cum back into t' street."

Ah lewkt off t'ee-end 'at that wizand owd barn,
An' ah said, "It appears like to me
'At t'factory an' t'mansion an' t'main o' t' consarn
Is uphodden by midges like thee."

Here ah pairted wi t' barn, an' ah cuddant bud laugh,
Thau ah felt noan so mich at my ease,
For ah thowt to myseln——it's a bonny come-off
If we're propt by sich pillars as theease.

Now I can well believe that slave-labour camps exist in Russia. The reason for it is neither Russianism nor Communism as such, but a stage of development that makes the use of slave labour economically profitable. I can also believe that the Russian treatment of the so-called Soviet Republics—colonies would perhaps be a better name—has not been designed so much for their advancement as for their exploitation. I attach the same degree of belief to stories of artificially induced famines in these colonies as I do to the story that a little more than a century ago the British were chopping the fingers off Indian weavers in order to force the Indians to buy British cloth.

The cure for what our consciences tell us are immoral Russian actions is a change to economic circumstances where these actions are no longer important. This change is not likely to be induced by a rain of atomic bombs on the Russian cities. Those who would suffer principally from this would be the Russian people, not the leaders; and, even if Communism were wiped out in Russia, is anyone confident that they could tackle the problem of raising the Russian standard of life in a better fashion than it is being tackled now? A few years ago Great Britain and the U.S. were fighting Germany and Japan tooth and nail, ostensibly on moral grounds. Once Japan and Germany were defeated, the air of moral purpose quickly departed from the victors. Indeed, all we have witnessed during the last few years has been a fumbling effort to restore the original economies of these countries. Does this inspire any confidence that the vastly more difficult task of putting Russia in order could be accomplished?

We must, I think, be very much on our guard against being led into an anti-Russian quarrel on moral grounds. If we are to burn to death millions of Russian children let us do it in the interests of our security, or to keep our stomachs full, but never in the interests of morality.

These considerations show, what has already been stated, that it is not easy to explain the strong anti-Russian feeling that now pervades the capitalist world. We have seen that no soundly based explanation can be given in terms either of anti-Communism or of a moral crusade. Yet we can scarcely suppose that such strong feelings have no proper roots at all. The question is: what are the roots? The following discussion outlines what seems to be the correct answer.

About sixteen hundred years ago the Slavic peoples were not much of a force in the world; they were merely a handful of tribes inhabiting the marshes and forests in the basin of the Pripet. In the intervening centuries the Slavs have expanded so greatly, however, that they have been able to push the Finns, who once occupied much of what is now Russia, into a corner of Northern Europe. They have also spread westwards almost into Germany and eastwards as far as the Pacific, which they reached in the 17th century. After a fallow period, the expansion has proceeded apace in recent years and is now threatening much of East Asia and is even looking to reach the Atlantic. This is, I believe, the cause of the present-day tension between 'West' and 'East'. We in the West are apprehensive that in its next stage Slavic domination may increase from a continental scale to being world-wide.

It is important that this real nature of Slavic Communism should be clearly understood. It is something that all of us in the West can readily understand; and it is something that we can all agree to stop from any further developments that would threaten our security. When, on the other hand, the issue is expressed as an anti-communist crusade we are simply playing the Russian game; for such a crusade must lose much of its force, since there are many people in the West who are not seriously opposed to society being organised in a communistic way—this quite apart from the Russian question. One of the important reasons why Communism holds sway in Russia is precisely because it allows the wool to be pulled over the eyes of these people. It is possible for a Frenchman, say, to believe quite sincerely that the communist form of organisation is better than a capitalist one. Such a person will naturally turn to Russia as an ally, and will accordingly be led to assist Russian expansionist aims under the guise of a communist comradeship. Multiply this case by many millions and the advantage becomes enormous. It was, indeed, in just this way that Russia managed to get hold of the secrets of the atomic bomb.

We see, therefore, that Communism is no more than a façade that has been erected to hide the real Russian driving-power. It is this difference, between the inner Russianism and the outer trappings, that has unseated so many communist leaders in the satellite countries; for being a sound communist is not the essence of the matter so far as Russia is concerned; the important thing is to be effectively pro-Russian. How far the Russian leaders are aware of all this is difficult to judge. If indeed they understand the matter clearly, we may set them down as clever statesmen. If they do not understand what is going on—if they believe themselves to be activated by Communism, when all the time they are being activated by expansionism—then we may describe them as the priests of a new religion; for it is the essence of a religious belief that, without realising it, we replace the real reason for our actions by inconsequential beliefs.

Logistics

In the previous chapter some indication has been given of what the possible atomic strength of the combatants in a future war might be. Such an analysis should, in itself, deter would-be expansionists from any adventure likely to precipitate a new world war. Not only this, but the potential strength of the West cannot be any encouragement to aggressive tactics by the communist powers. This will be seen from the following table, which compares the productivity of North America with that of the U.S.S.R. To take account of the expansion of the heavy industries of the U.S.S.R., estimated figures for 1955 have been quoted where available. For North America, on the other hand, I have given conservative industrial estimates by taking the figures for 1948, instead of the much higher post-Korean values. Since agricultural productivity cannot rapidly be increased, it has been thought sufficient to quote figures for the period 1946–48. This probably somewhat underestimates present-day productivity on both sides.

	U.S.S.R.	U.S. AND CANADA	COMMENT
Population	193 m. (1946)	163 m. (1951)	
Wheat	15% of world crop	28%	
Rye	59%	2·5%	
Maize	2%	60%	

	U.S.S.R.	U.S. AND CANADA	COMMENT
Oats	16%	46%	
Barley	11	21%	
Potatoes	30%	7%	
Cotton	9%	47%	
Sugar	8%	38%	Includes W. Indies
Butter	Pre-war very small	46%	
Cattle	49 m.	75 m.	
Sheep	80 m.	53 m.	Australia has 110 m.
Pigs	24 m.	52 m.	
Poultry	210 m.	410 m.	
Meat	3.7 m. tons per ann.	8.8 m. tons per ann.	
Milk	23 m. ” ” ”	55 m. ” ” ”	
Flax	Main world crop.	Negligible.	
Rayon	Negligible.	Main world production.	
Rubber	Serious shortage.	World's largest production of synthetic rubber.	Malaya—world's largest production of natural rubber.
Timber	Large supply.	Large supply.	
Coal	375 m. tons per ann. (1955)	650 m. tons per ann. (1948)	
Oil	500 m. barrels per ann. (1955)	2,000 m. barrels per ann. (1948)	
Iron	30 m. tons per ann. (1955)	61 m. tons per ann. (1948)	
Steel	45 m. tons per ann. (1955)	92 m. tons per ann. (1948)	Estimated West European Steel production 80 m. tons per ann. for 1955.
Aluminium	?	60% of world production.	
Copper	?	40%	
Lead	?	35% *approx.*	
Zinc	?	40% *approx.*	
Molybdenum	?	80%	
Magnesium	?	Very large supplies.	
Nickel	?	Canada is world's largest producer.	
Platinum	Once world's largest producer.	Canada and South Africa now world's largest producers.	

When to this list is added the contribution of Great Britain and of the rest of the Commonwealth, the dominance of the capitalistic powers in productivity is quite overwhelming. Then what, we may ask, is there to worry about? Could it be that the East might strike while the West was still unprepared for war? The section of the previous chapter that dealt with atomic bomb production provides an answer to this; namely, that the state of preparedness for atomic warfare in the West is now such that there can be no question of the East being able to carry off successfully a war that was based on smash-and-grab tactics. This being the case, one can but look on the present hysteria over the communist menace, especially the hysteria in the U.S., as a genuine mystery.

What, for instance, was the purpose of the war in Korea? The usual answer would, I suppose, be that the war in Korea was fought with the object of convincing the communist powers of our earnestness of purpose. I can scarcely believe, however, that the Russians saw the matter in this light. My impression of the point of view of a Russian leader is rather along the following lines:

'The war in Korea convinced me (so says the Russian leader) that at the bottom the Allies must be very stupid. On account of the great potential strength of the West, my strategy has always been to avoid a direct frontal clash. Instead, my aim is to seek every opportunity of draining off the excess American strength in some unimportant action. The Korean war therefore suited me admirably. Indeed the Korean war satisfied a two-fold purpose: it provided a sink down which the Americans poured their resources, and it improved my bargaining power with China. Thus China has been obliged to make favourable terms with me in order to receive a supply of Russian arms. If the Americans can further be persuaded into open warfare against China, this will suit my purpose even better.

'So far (continues the Russian leader) there has been but one item of Allied policy that is not entirely to my liking. I refer to the rearmament of Germany. My objection to this is not that it will necessarily benefit the West, but that it introduces an uncertain factor that would better have been avoided. When Germany is rearmed I shall attempt to persuade the Germans to come over to the Russian side. This is not at all an impossibility, since we Russians happen to hold the trump card where the Germans are concerned. Much of German national feeling was smashed by the late war, but some still remains. Thus while the average German has no strong feelings for or against Communism, he does have a strong desire to reunite East and West Germany again; this is the bribe by which I shall try to tempt him over to my side. If need be, the Poles must be sacrificed to this end. By moving the Poles back from the Oder-Neisse line, I shall be in a position to offer the Germans vastly more than the Western Powers can.

'There are some people in the West who believe that the Germans will never again come over to our side because of the harsh way in which we Russians have treated them. If this is intended as a moralistic argument it backfires badly, because we have meted out less harsh treatment to the Germans than we received from them during the late war. Indeed of those who say that the Germans can never be persuaded to throw in their lot with the East, I ask: how can one be sure of this? Take the case of England, for instance. In the past, England has fought for and against us, for and against Germany, for and against the U.S., for and against France, for and against Spain, for and against Italy—and so I could go on. In view of evidence such as this, who can say just how any particular country will act in the future? I certainly cannot, and all I can do, if the Allies persist in rearming Germany, is to take every possible step to ensure that Germany finally comes the Russian way. Should I succeed, the gain will be enormous. Without German rearmament we Russians are outclassed in productivity by North America; but with German rearmament and German production a good deal of our disadvantage would be gone. A combination of Germany and Russia is the one way I can see of defeating the Allies by direct frontal assault.

'Of course we Russians may not succeed in winning the Germans over; but even so it is still possible that matters will work out to our advantage. A few years after German rearmament gets under way the most powerful military force in Western Europe will be German. When this stage is reached it will be easy for the Germans to undertake the manufacture of atomic bombs, whatever the Allies may think about it. A few years more, and Britain and France will be certain to get the wind up, especially Britain with her hopelessly vulnerable population centres. The stage would then be set for a major conflict in the West. Should this happen, atomic warfare will ensure that destruction is on a greater scale than in the late war. In this way it is possible for the Western Powers to be so weakened that my present disadvantages would be largely cancelled.

'I might add (concludes the Russian leader) that if at any time I am forced to make a stand-up fight of it, I shall use to the utmost the situation that in the West—the U.S. included—there are such very large population centres. It is curious that, while the Allies took such pains to teach me a lesson by the devious process of fighting the Chinese in Korea, they are making no effort to reduce their own vulnerability to air bombardment, which is really their one and only weakness. Britain in particular, so far from being a serious enemy, is in such a defenceless position that she might well consider herself to be a hostage in our hands.'

The Strength of the West

At this stage it might be as well to look at the matter from the point of view of the Allies. We have already seen that the Allied hand could be an extremely powerful one. Disaster to the West can come only if our cards are played very badly, as indeed they are being played badly at present. Now what line of action can we take in order to improve things? First an immediate withdrawal from Korea. If it be said that to do so would be to lose 'face', then let us lose as much 'face' as we can in the shortest possible time. If it be said that the Russians will come in when we move out, then let the Russians move in; this is directly in our interest, as we shall soon see. After washing our hands of the entanglement of Korea, the next step is to put an end to the rearmament of Germany and Japan, since this is a policy much more likely to lead us into trouble than to get us out of it. Let us also stop the present ruinous expense on weapons of the traditional out-of-date pattern. Let us stop bringing Western Europe into bankruptcy by the need to maintain an army, an army which—short of an overwhelming

German contribution—the Russians could probably lick anyway; the Russians are far more likely to be dissuaded from an attack on Western Europe by the prospect of a rain of 10,000 atomic bombs on their towns and cities than they ever will be by a Western European army. Let us root out the military schizophrenia from which the Western World seems to be suffering: namely the knowledge of the striking-power of the atomic bomb on the one hand, and the desire, which seems apparent on the other hand, to persuade ourselves by a grandiose use of out-dated concepts and methods that the atomic bomb does not really exist, or at any rate that it has not made much difference. Of course it has made a difference; a difference as great as that between the rifle and the bow and arrow. Let us make up our minds once and for all that if the match should start, the first ball bowled shall be an atomic thunderbolt: it will certainly come to that in the end; since henceforward no nation that possesses atomic weapons is going to allow itself to go down in defeat before it has given those weapons a try-out. Let us, to put the matter briefly, tell the Russians quite plainly where they get off. Let us say that any move by the Russian army into Western Europe will be taken as a Russian declaration of war, and let us say quite frankly—because this is now what war really means—that such an action will be greeted by the outbreak of atomic hostilities. Let us, moreover, prepare ourselves for such a contingency. Let us stockpile as many bombs as we can and let us build the very best aircraft in which to carry them. Above all, let us rid ourselves of the delusions that we are still soldiering in the first half of the twentieth century.

To return now to the Far East: our policy there should be to encourage Slavic expansion as much as we can. Let the Russians be saddled with the problem of dealing with expanding populations other than their own. Let them have the job of trying to provide a reasonable standard of life in China, and in any other Eastern country into which they can be inveigled. In case the reader imagines this to be a foolish suggestion, I should like to underline the problem that the

Russians would be set at some length. Compare the following weekly diets of a Javanese and of a New Zealander:

	JAVANESE	NEW ZEALANDER
Rice	5 lb.	—
Bread	—	2·75 lb.
Roots and Tubers	6 lb.	2 lb.
Sugar	3 oz.	2 lb.
Fats	1·5 oz.	1 lb.
Peas and Beans	1 lb.	1 oz.
Fruit and other vegetables	2·5 lbs.	6 lb.
Meat	5 oz.	6 lb.
Milk	—	3 quarts

The Javanese diet may be taken as a good-class example of a Far Eastern diet, and the New Zealand diet as a good example of a 'Western' diet. The disparity is at once evident. In the highly nutritive foods, the New Zealander is very well off: when he has ample meat he does not need to bother about the low-class foods. The Javanese, on the other hand, has little or no really nutritive foods, and so he has to make up by eating food of low quality.

It is well-known that Allied prisoners-of-war in Japanese hands suffered very seriously from lack of food. It is usually implied that this was a matter of deliberate Japanese policy, and no doubt this was so to some extent; but the main effect was the reduction from the Western standard of diet to the Far Eastern standard.

This, then, is the problem that I would like to see in Russian hands. The Russians not only aim themselves towards the Western standard of diet, but they claim that Communism will enable the undernourished peoples of the East to all obtain this diet. It would be interesting to see how they would go about establishing this claim. Presumably some such considerations as those shown in Fig. 1 (next page) would guide them. The first map in Fig. 1 gives actual land areas; the second

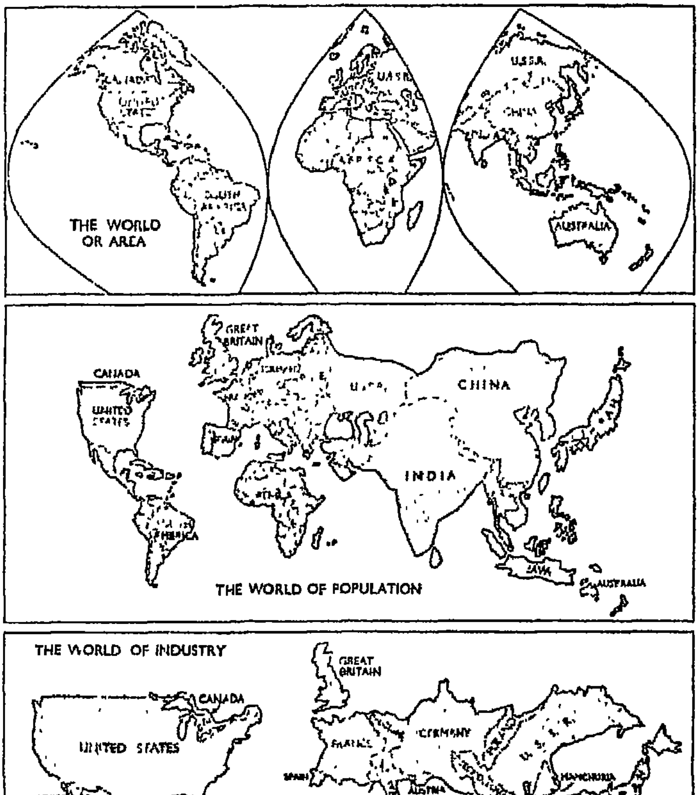

FIG. 1

The first map gives actual land areas, the second (taken from *Life*) gives land areas multiplied by population densities, and the third (compiled by National Opinion Research Center, U.S.) gives land areas multiplied by a factor that represents the degree of industrialisation.

gives the product of the land areas and the population density; and the third shows the land area multiplied by a factor that represents the degree of industralisation and mechanisation. As an aside we may note that a comparison of the various diagrams shows clearly why the German economic situation is so much healthier than the British. The over-population of Great Britain and the under-population of the Dominions is also strongly brought out. The general state of affairs in the East is plain: over-population combined with a scarcity of machines.

No doubt the Russians would seek to tackle the Far Eastern problem by trying to provide a large number of machines, putting a strain on their own production and thereby reducing their output of armaments. It would soon be found, however, that the mere provision of machines is not a complete answer to the problem. The over-population of the Far East is so gross that, inefficient as agricultural methods are, there are so many people now labouring on the land that food output is very nearly as high as it would be even if an unlimited supply of machines were available. Probably a large-scale provision of fertilisers would be more efficacious than the provision of tractors. If then the provision of machines is no real answer, what else can be tried? To copy the industrialisation of Japan perhaps? Elsewhere than China, however, where considerable mineral wealth exists, conditions for industrialisation are not favourable in the East; and even if industrialisation could be carried out, how would this produce more food? It would be useless to rely on exchanging manufactured goods for food, since this is rapidly becoming an outplayed procedure. If the present trend of world-wide industrialisation continues we shall soon have every country trying to sell manufactured goods to people who do not want them in exchange for food that no one has got.

Let us leave the Russians for a moment with their problem. It need scarcely worry us, by the way, that Slavic expansion in the East would put large numbers of people under Russian control. If there should be a war, sheer number of people would be of no advantage to the Russians, rather would it be a disadvantage: we have seen that modern atomic bomb production is capable of slaughtering people on an enormous scale.

Now assuming the situation described above to have come about, consider how the West can better its position. The British migration scheme described in the previous chapter would enormously improve our defence, since it would remove Britain's vulnerable population centres. At the same time industrialisation in the Dominions would greatly expand Allied industrial power. The U.S. should also set about a programme of industrial development, through the introduction of electrical control in mass-production. This revolution of technique should be accompanied by a redistribution of population designed to reduce vulnerability to air attack.

Suppose now that this also has happened and let us look 25 years ahead. Instead of weakening themselves in futile hot-headed forays, the Western Powers have by now enormously increased their lead over the unfortunate Russians, whose attempts to get more food out of territory that inherently will not grow more have met with scant success. Perhaps, to be fair, we may say that by great efforts a 20% increase in food production has been achieved. Has the Far Eastern standard of living risen commensurately? Oh dear me, no. The increase in food production has been more than offset by a rise of more than 20% in the population.

The population of East Asia is increasing at such a rate that it will double in about 70 years at most—in the case of Japan in only 35 years. Thus the Russians might come to discover that the precious fluids of productivity is being poured into a leaky bucket; that as soon as resources increase so does the population. They might come to interpret the following figures* in this light:

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*Taken from E. W. Zimmermann, *op. cit.* (p. 35). Some uncertainty must necessarily be attached to the earlier estimates, especially to those for Africa.

WORLD POPULATION ESTIMATES (IN MILLIONS)

	1650 A.D.	*1750*	*1800*	*1850*	*1900*	*1936*
Europe	100	140	190	270	400	535
North America	1	1·5	5	25	80	140
Cen. and Sth. America	10	10	20	35	65	125
Africa	100	95	90	95	120	150
Asia	330	480	600	750	940	1150

They might come to realise that any conceivable increase in food production can easily be compensated by an increase in numbers; that resources, except under the most favourable conditions, cannot rise faster than the population. They might indeed come to understand the enormous expansive property of a geometrical progression: two people in this generation producing four in the next generation; four in the next generation producing eight in the second generation; eight in the second generation producing sixteen in the third; . . . Here is a little story*.

HOW THE GAME OF CHESS WAS INVENTED

Ibn Khallikán relates as follows in the Life of Abú Bakr al-Súlí:

> Sincere in his religious belief and virtuous in his conduct, he merited the confidence which was always placed in his word. As a chess-player he was without equal, and, even to the present day, it is said as a proverb of a player whose skill one wishes to extol, that his game is like that of al-Súlí. I have met many people who believe al-Súlí to have been the inventor of chess, but this is an erroneous opinion, that game having been imagined by Sissa the

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*Taken from *The Week-End Caravan,* compiled by S. Hillelson. W. Hodge & Co.

son of Dáhir, an Indian, for the amusement of King Shihrám.

It is said that, when Sissa invented the game of chess and presented it to Shihrám, the King was struck with admiration and filled with joy; he had chess-boards placed in the temples, and he expressed his opinion that the game was the best thing man could study, inasmuch as it served as an introduction to the art of war, and that it was an honour to the Faith and the World, as well as the foundation of all justice.

The King also manifested his gratitude and satisfaction for the favour which Heaven had granted him in shedding lustre on his reign by such an invention, and he said to Sissa, 'Ask for whatever you desire'—'I then demand', replied Sissa, 'that a grain of wheat be placed in the first square of the chess-board, two in the second, and that the numbers of grains be progressively doubled till the last square is reached: whatever this quantity of wheat may be, I ask you to bestow it on me'. The King, who intended to make him a worthy present, exclaimed that such a recompense would be too little, and he reproached Sissa for asking so inadequate a reward. Sissa declared that he desired no other gift and, heedless of the King's remonstrances, he persisted in his request. The King at last consented, and gave orders that the required quantity of grain be given to him. When the chiefs of the royal office received their orders they calculated the amount, and answered that they did not possess near as much wheat as was required. When these words were reported to the King, he was unable to credit them and had the chiefs brought before him; when questioned on the subject they declared that all the wheat in the world would be insufficient to make up that quantity. They were asked to prove the truth of this contention, and by a series of multiplications and reckonings they demonstrated that such was indeed the case. The King then said to Sissa, 'Your ingenuity in imagining such a request

> is even more admirable than your talent in inventing the game of chess.'
>
> The way in which the doubling of the grains of wheat is to be done consists in the calculator placing one grain in the first square, two in the second, four in the third, eight in the fourth, and so on, until he comes to the last square, placing in each square double the number contained in the preceding one. I was doubtful of the contention that the final amount could be as great as was said, but when I met one of the accountants employed at Alexandria, I received from him a demonstration that convinced me that their statement was true: he placed before me a sheet of paper, on which he had calculated the amount up to the sixteenth square, obtaining the result 32,768. 'Now,' said he, 'let us consider this number of grains to be the content of a pint measure, and this I know by experiment to be true'—these are the accountant's words, so let him bear the responsibility—'then let the pint be doubled in the seventeenth square, and so on progressively. In the twentieth square it will become a *wayba*, the *wayba* will then become an *ardeb*, and in the fortieth square we have 174,762 *ardebs*; let us consider this to be the contents of a corn-store, and no corn-store contains more than that; then, in the fiftieth square we shall have the contents of 1,024 stores; suppose these to be situated in one city—and no city can have more than that number of granaries or even so many—we shall then find that the number required for the sixty-fourth and last square corresponds to the contents of 16,384 cities; but you know that there is not in the whole world a greater number of cities than that. This demonstration is decisive and indubitable.

Now it is just possible that the Russians would not only be able to understand this, but that they would be prepared to do something about it. It is possible that, in their blunt way, they would tackle a problem that the Western World is too squeamish to even consider, let alone do anything about. Instead of saying 'Oh dear, dear, we mustn't start interfering in people's personal affairs' they might by propaganda, exhortations, and threats be able to keep the birth-rate at such a level as to maintain a stable population. Should this come to pass, the single longest stride towards saving our present civilisation from destruction would have been taken.

The Hard Way

Let us suppose now that the Western World has somehow managed to bring this about. Let us suppose that during the next twenty-five years the population growth in the world becomes halted for good and all and let us suppose that the West is poised ready with enormous industrial capacity. Then what, we may ask, can be done about the appallingly low standard of life of the great bulk of humanity? First, there is the increase of agricultural productivity that can be gained by better techniques, more fertilisers, specially bred plants. . . . Now, how far can this go? The answer to this query must be to some extent a matter of opinion until the issue has actually been put to the test. As in all issues where opinion is not entirely dictated by the observed situation, the suggestions put forward depend on the emotional temper of the individual concerned. Thus, many who are of a religious turn of mind readily maintain that food production can be increased almost indefinitely. These people, whenever they discuss the matter are always full of stories of new agricultural methods, entirely new plants . . . that they have heard to be capable of giving fabulously increased yields. To them, the matter does not need any detailed argument; they need only appeal to the following principles: the laws of God forbid any artificial limitation of the birth-rate; hence if this leads to a rise of population it must follow that God is taking the responsibility for providing more food. These people apparently never stop to think that the practice of agriculture is something like ten thousand years old and that modern science has added comparatively little to it: civilised man has not so far succeeded in adding one really major food crop; all the important plants we now cultivate were known to barbaric societies. It is true that we have managed to improve existing species, but this scarcely warrants an overweening confidence in the astounding new discoveries with which religious opinion seeks to support its views. Indeed, the nearer one approaches those who have the actual job of dealing with these questions, the more sober do the estimates become. I know of no agricultural expert who suggests that, by the methods referred to above, production in the regions at present under agricultural cultivation could be anything like doubled. I think it might be a fair estimate to suggest that with a concerted effort production might be increased 50%, but this unfortunately would not be sufficient to give anything like the required lift to the standard of living of the Eastern peoples.

What more can be done? Our best hope of extending food production in a really significant way is to bring new regions under cultivation. To see where such regions might be located we note that the twin requirements for high productivity are sun and water. Now the parts of the Earth that receive the most telling combination of sun and water are certain parts of the tropics: the Amazon basin, the valley of the Niger, the Congo basin, Malaya, and parts of the East Indies. Only in the last is any significant quantity of food at present being grown. How much could be produced in the other tropical areas is shown by the case of Java, a comparatively small island that grows sufficient to feed, however inadequately, about 50 million people. The vastly greater potentialities of the Congo and Amazon basins have scarcely yet been touched. Should they be developed so as to deliver vegetable growth of direct food value, it is not too much to suppose that the total world food production might be doubled from this source alone. In this way a solution of the food crisis can probably eventually be found.

It would be easy to dismiss this tropical project as a grandiose ground-nuts scheme, but such a condemnation would be quite misplaced. The British ground-nuts plan was not misconceived in the sense that it attempted to open a new field of production, it was wrong in the way it attempted to do so. At least three important mistakes were made: the scheme should not have been started until it was certain that adequate machinery was available; the crop was decided on too hastily; and, perhaps most important of all, marginal agriculture in the tropics must always be a project of dubious wisdom. By marginal is meant agriculture carried out in regions that fringe the main climatic zone. Changes of climate, either in the sense of an increase or a decrease of rainfall, can easily wreck a scheme that operates in such an area.

Contrast this with the following proposals for implementing the agriculturalisation of the Congo basin. The first step must be to produce adequate machinery for the rapid clearing of heavy vegetation from large tracts of land. It would be well-nigh useless to begin a major project until such machinery was available, for it would be pointless to start by clearing small patches of land only: this would lead to an endless war against an encroaching jungle. Once the clearing is started, it must be quickly completed. That is to say, the project would have to be conceived as a complete clearing of the present vegetation from the whole Congo basin. Since rates of growth in a jungle are large, this would have to be done with great speed. Machinery of a very special type would therefore be required. We need methods that go as far beyond the bull-dozer as the bull-dozer goes beyond the spade. It is by no means impossible to produce such machinery. In the scheme discussed above, this would be a task that could readily be tackled by the powerful industries of the U.S. and the Commonwealth.

Next we notice that a clearing of the present vegetation from the Congo basin would considerably modify the climate there. The modification would, however, be one of degree, not of kind. In particular, even if the rainfall were reduced by as much as 50%, there would still be abundant rain: this is an important consequence of working in the main climatic zone. In this connection, it is possible that the modification of climate in Central Africa might have the effect of substantially increasing the rainfall in marginal regions that are at present too arid for cultivation, thereby giving a further increase in productivity.

The modification of climate could scarcely reduce the rainfall to the level where tillage of the soil could readily be carried out; the heavy African storms would probably tend to strip off and wash away the top soil. But even if precautions against this were difficult to make, it would still be possible to avoid systematic tillage and instead to grow great quantities of grasses to be used as feeding stuffs. The world is at present extremely short of animal feeding stuffs. Sufficient carbohydrates are being, or could be, grown; the ultimate shortage lies in animal products. Now the number of animals that can be kept is determined by the supply of feeding stuffs. Thus the development of the Congo basin, without any tillage, must show itself in a vast increase in animal products. Similar remarks apply to the other great tropical areas.

Thus it seems that the present problem of world food production can perhaps just be solved, but only by a bare margin; only if the present world population is stabilised at its present level, and this can scarcely be achieved except through controlled action. Under uncontrolled conditions the necessarily slow rise of food production would simply result in a corresponding rise of population. There is no hope at all of such an extremely rapid increase of productibity that the population rise would fail to keep step with it. Thus unless the population is forcibly stabilised there can be no possibility whatsoever of an end being put to the miserable conditions that at present exist in the under-privileged countries. For myself, I see the best hope of securing this action from the Russians, not from the West. The West is too riddled by such notions as 'the rise of population is the will of God and must not be interfered with' for it to be able to make an effective contribution in this matter.

Perhaps we should consider an example of the ineffectiveness of Western thinking on this matter. It has for instance been widely argued that if we could increase the standard of life in the backward countries, sharp falls in their present very high birth-rates might be expected to occur automatically. In support of this argument it is claimed that in recent times a marked fall in the birth-rates of the countries of Western Europe have been associated with a rising standard of living. But this is a serious misreading of the facts. It would be more accurate to say that the populations of Western Europe went on increasing until Western Europe was on the verge of general decline—if indeed the decline were not already under way. In so far as changes in birth-rate have been associated with changes of living conditions, experience is perhaps best represented by the precept:

> *That when changes of birth-rate occur, the changes are in such a direction as will reduce the rate of change of the living standard.*

In other words notable increases of birth-rate go with rises in the standard of living, and declines of birth-rate go with a falling standard of life. This precept not only fits experience in Western Europe reasonably well, but it is in accordance with present-day conditions in the U.S., where both the living standard and the population are increasing quite sharply. The case of the U.S. is in discordance with the view that a high standard of living implies a low birth-rate.

It is of course the case that while a precept of the sort just announced may fit experience fairly well, it cannot be given the status of a mathematical proposition or of a physical law—this, if only because the concept of the 'standard of living' lacks quantitative definition. How for instance would we measure a social change in which food availability is reduced in some minor degree, but in which television is invented?

The More Distant Future

Now that we have reached a world situation in which everyone might be adequately fed, clothed, housed and provided with a modicum of luxury, we may ask: can the world continue indefinitely to enjoy such material bliss? By no means. Even granted that all the above requirements have been successfully met, enormous problems still remain. These are brought out by the following table of U.S. mineral reserves.

Commodity	*Number of years required for exhaustion of worked deposits at present consumption rate (1948)*
Iron	76
Arsenic	55
Cobalt	53
Sulphur	39
Bismuth	36
Bauxite (Aluminium)	23
Zinc	20
Copper	19
Oil	15
Lead	10
Manganese	4

Fortunately these figures are not as alarming as they might appear at first sight. Indeed they must be interpreted with a considerable degree of caution. In the first place they refer only to known deposits, which is particularly important in the case of oil. More important, the exhaustion figures for the metals do not refer to a complete consumption of all metallic ore: that is not a physical possibility, since there is an effectively unlimited amount of all these substances in the Earth's crust. These figures refer to the exhaustion of only those deposits that can be worked economically at the prices in operation at the time (1948). At higher prices, ores of lower grade could profitably be worked and this would extend the estimates given in the second column.

Rising prices can be interpreted as indicating that more labour and more energy are required to extract the materials in question. So long as the efforts which have to be made do not increase alarmingly, however, this is not a far-reaching sociological matter; it affects the economics of the metal market, and that is all. But for a sufficient increase, a stage would be reached when the provision of raw materials would begin to place an intolerable strain on the world community as a whole. How far is this time away? The answer to this question depends on technology. Thus with present methods it would be extremely awkward to obtain an adequate supply of copper if the ore that had to be worked was as low as 0·1% in copper content. Such a state of affairs will in fact overtake the world in a century or so, if the present rate of consumption of copper is maintained. What will happen then? Well, either electrical goods containing copper will become very expensive, or during the next hundred years new technological processes must be discovered that enable 0·1% copper ore to be worked much more cheaply (with less consumption of labour and energy, that is to say) than it can be worked today. Should this happen, copper resources will have become effectively much greater than they are today, since the amount of 0·1% ore that can be mined is very large indeed; much greater than the amount of 1% ore. Thus we see that an estimate of resources has no meaning unless it is related to technology. Technology makes resources.

It follows that arguments maintaining that modern civilisation is rapidly using up the industrial resources of the Earth must be qualified. *So long as technology keeps ahead of consumption there is no such thing as a using-up of reserves.* What is true, however, is that technology must keep ahead in the race. Only so can our civilisation survive. This then, is one of the great problems that is certainly going to face humanity in the centuries to come. Unless our age succeeds in establishing society on a sound basis, there seems little chance that mankind will be in any condition to face up to a problem of such a magnitude when the time arrives.

Conservation of resources deserves consideration in this connection. The idea of conservation is simply not to waste materials unduly by adopting a policy of careful preservation of all metal scrap, and by only using resources very sparingly. Conservation is not a solution in itself, however, as was formerly believed by some people. Wastage cannot be entirely eliminated, and even slight waste would lead to an eventual exhaustion of resources, if resources were a fixed, determinate quantity. But once we introduce the dynamic concept of resources, conservation becomes of added importance. We can make it much easier for technology to keep in the lead, if at the same time as we strive for technological advances a policy of careful conservation is maintained. If ever we get behind in the race it will indeed be difficult to catch up again. Our civilisation is skimming the cream of the world's mineral deposits: no one is likely to be more favourably placed to make further technological steps than we are.

Now it will not be easy to maintain an adequate conservation policy if the population of the whole world remains pushed up to a maximum level. There is no particular virtue in supporting the maximum number of people; the world could manage quite well on a half, or a quarter, or even a tenth of the present population. Consequently in the interests of conservation and of the ensuing technological advantages, I think we should contemplate a gradual reduction of population. That is to say, the birth-rate should be kept some ten or fifteen per cent *below* the value needed for complete stability. In this way, without any really serious adverse consequences, the population would decline in about 500 years to about a third of its present value.

In connection with this proposal, we may note a fallacy in an objection that has been put forward to the idea of population control. It has been claimed that experience of population variations suggests that a declining population is always associated with psychological degeneration. This puts the cart before the horse. Those cases where populations have in fact declined have done so precisely because of an initial psychological degeneration, not the other way round. On every day when a certain individual works, it is observed that he takes a bus from his suburban home into the city. Is it a sound inference to say that the individual works on every day that he takes a bus from his home to the city?

There is a further reason besides that given above why a reduction of population is probably essential. In the future we may be obliged to use some of the Earth's surface to provide a source of power. This will make the area of land available for food production somewhat less than it is now. Thus in about five hundred years we shall be faced, not with a mere reduction in the grade of our coal and oil deposits, but with their complete world-wide exhaustion. It will then be necessary to obtain some other primary source of energy. This can be done in two ways. One is through the fission of thorium or uranium: through building large numbers of nuclear reactors, in fact. This project seems unattractive, however, as a long-term measure, for two reasons. Deposits of high-grade uranium and thorium ores would also become exhausted, and much energy would have to be wasted in working up lower-grade ores to a usable form*. The second objection is that so far no suitable means has been found for the disposal of the large quantities of very poisonous radioactive waste products that are continually accumulated by these nuclear reactors. Unless some entirely new idea for dealing with waste comes along, it will be preferable, for this reason alone, to use an entirely different method of obtaining a new energy supply.

A perhaps more promising method consists in utilising

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*Dr. Harrison Brown of the *California Institute of Technology* has recently made a thorough investigation of these points. He tells me that the energetics of the working-up of low-grade ores is particularly severe in the starting-up of a large-scale programme of nuclear energy production, but that the difficulties would be much reduced once such a programme was in full swing. The reader interested in these topics is referred to a forthcoming book by Dr. Harrison Brown in which all these questions of world resources and populations are discussed.

nuclear reactions taking place, not on the Earth, but in the Sun. These latter reactions supply the energy radiated by the Sun, and this is so vast that even a small portion of the Earth's surface intercepts sufficient energy, if it could be converted into a usable form, to keep the whole of the world's industry going. Now perhaps the best method of conversion is one that we are all familiar with, namely the conversion that occurs when plants grow. The solar energy stored away in plants can be recovered: for example, by burning; or alternatively the plants can be fermented to produce alcohol, which then can be used to replace petrol. A land area smaller than the Belgian Congo could in this way provide the world with its power source, even allowing for substantially increased demands being made in the future. This source would have the enormous advantage of being permanent, or at any rate of being permanent compared with other sources of power; for solar energy can be depended on to remain available to us for several thousands of millions of years.

Given adequate and permanent power it needs only technological knowledge to provide an unending supply of minerals, quite regardless of the fact that we shall be forced to work down to lower and lower grades of ore. Given the continued means of industrialisation and given the Earth on which to grow food, it only needs man to take a firm grip on himself to ensure the continued survival of civilisation.

By way of summarising the above discussion, we note that the route man must follow is not a complicated one. The main points are very simple, and are easily grasped. First, the standard of living depends on the ratio of productivity to population. Taking the world as a whole, this ratio is much lower than it is in the Western countries—does the British Socialist really believe in 'fair shares'? To improve the standard of living, productivity must rise, but the immediate scope for this is so limited that the rise can easily be cancelled by a corresponding increase of population. Thus, in order for there to be any important improvement, the world's population must be stabilised at its present level—it is at present increasing by about 1% per annum, compound interest. I have suggested that the Russians are more likely to accomplish this than the Western Powers. Russians are not squeamish about their methods; they are confident that they can deal with the populations in question; and, moreover, the past actions of the Western Powers do not inspire much confidence in their being able to cope with the problem. What the Western Powers can do for their contribution is to bring off a very large-scale industrialisation; this being necessary to ensure that two important tasks are carried out. One is to provide the machines required for the development of tropical agriculture, and the other is to maintain technological knowledge at the highest level. When this stage is reached, it should be possible for the world to stabilise itself with the production to population ratio at a reasonable sufficiency. Henceforward, there should be a steady endeavour to reduce population levels gradually, both for reasons of mineral conservation, and so that food production can ultimately be reduced without discomfort, when it becomes necessary to seek a new power source; after coal and oil deposits become exhausted, or as they are beginning to run down.

All this is so clear that we can have some hope that the peoples of the world will indeed elect to follow such a route. The alternative path leads through very unpleasant territory. Let the swelling of the world's population continue for another couple of generations and all hope of a peaceful settlement will be lost. The world will then have inevitably outrun its total resources, and the different peoples will, with equal inevitablity, fight amongst themselves for possession of the inadequate supplies. The fighting is likely to lead to the utter destruction, not of the forty millions or so who lost their lives in the late war, but of hundreds of millions. That this is not an undue exaggeration may be seen from the discussion of the destructive powers of atomic bombardment, given in the previous chapter. The weapon ideally suited to unprecedented slaughter has now been perfected. It is being produced in large numbers and it is very cheap to make. Of course, once a thousand million or so people have been exterminated there will again, for a time, be enough for everybody. Some measure of stability may then be regained. The issue now before us—today—is whether we wish to reach stability in such a fashion, or along the comparatively tranquil path that we have just discussed.

CHAPTER IV

The Rise of Humanity

> 'A strange picture we make on our way to our chimeras, ceaselessly marching, grudging ourselves the time for rest; indefatigable, adventurous pioneers.'

The outlook so far developed disagrees in a large measure with the popular 'isms' of the present day. It has been an important feature of our argument that Capitalism, Communism, and Socialism—in so far as the significance of production to population is ignored in these creeds—are all much of a muchness: whichever system is adopted the outcome is likely to be very nearly the same.

This implies that the relation of resources to population lies deeper in the organisation of human society than the more immediate issues with which we are concerned in everyday politics. Now, it seems that any really deep-rooted factor must also have been of great importance in past ages. Hence we see that an historical analysis provides a valuable test of the ideas put forward in the preceding chapters. An historical survey accordingly represents an appropriate form of conclusion.

The Food Gatherers of Ancient Times

During the last six hundred thousand years or so the Earth has witnessed not only the rise of man, but also a number of marked climatic changes. The main changes consisted of a number of Ice Ages, periods when the northern temperate latitudes of Europe were inundated by ice fields that spread down from the Arctic. During an Ice Age the present distribution of climatic zones, tropical forest, sub-tropical desert, temperate grasslands, northern forests, and arctic ice became more compressed, with a resulting virtual disappearance of both the sub-tropical deserts and the northern forests. That is to say, during an Ice Age there were luxuriant grasslands to the south, succeeded near the equator by tropical forest. Now although in the Ice Ages the land surface available for habitation was reduced, this was not a matter of much concern to the small nomadic populations of prehistoric times. The availability of food in the regions not occupied by ice was of more importance. This was not necessarily less during the Ice Ages; indeed under suitable conditions of technological skill it would seem to have been more.

The chronology of the Ice Ages is still uncertain, different authorities offering widely different estimates. As a rough indication we may say that each Ice Age lasted for about 50,000 years, the first one starting about 600,000 years ago, the second about 450,000 years, the third about 200,000 years, and the fourth about 75,000 years ago. It may be noted, as a detail, that a temporary retreat of the ice seems to have occurred some 30,000 years ago. The ice came on for a second spell, but began retreating again perhaps about 12,000 years ago. The ice was already pushed back to the present arctic zone about 8,000 years ago: there was a warm climate with deciduous trees growing in the northern latitudes about 6000 B.C. This warm climate began, however, to deteriorate about 4000 B.C. Although rain continued to fall profusely in the temperate zone there was an increasing shortage of rain in sub-tropical regions, with a consequent slow spread of the sub-tropical deserts. The increasing desiccation would seem to have continued into modern times. Changes of climate have probably had a considerable influence on man's development; since changes of environment tend to promote rapid evolution.

We see man at the dawn of prehistory as possessing little advantage over the other animals except perhaps language and fire. To begin with, he had but little clothing and his hunting tools were no more than suitably shaped stones that he had managed to pick-up in a natural state. After a time, however, it was discovered that tools can be made artificially. Two methods of shaping stones were used. In Africa, West Europe, and South India what are known as core tools were produced; these being worked by striking bits off a stone until a suitable shape was left. In Central Europe and Eurasia, on the other hand, flake tools were produced, by striking suitably shaped flakes off larger stones. There are several interesting points about these two procedures, which differ rather as a photographic negative differs from the positive, rather as Capitalism differs from Communism. We have evidence of a uniformity of technique over wide areas, indicating that there was a considerable degree of communication among primitive men. This is perhaps not surprising when we consider that 5,000 miles is not a very great distance for a nomadic people to travel in a hundred years, let alone in a hundred thousand years. More notable is the development of two firmly established, mutually exclusive, social conventions. Here we have an example of the way in which arbitrary conventions can gain control over man's outlook.

We have referred so far to man. It must now be said that the creatures in question were not all members of the species *Homo Sapiens*. *Homo Sapiens* was but one of a number of species that evolved from primitive ape-men, perhaps a million years ago—the exact dating of this evolution is also quite uncertain, but we know fairly definitely that the differentiation of species had already taken place some 250,000 years ago. Prominent among the several species was *Homo Neanderthalis*: judged by the skeletal evidence Neanderthal man seems indeed to have been dominant until about 30,000 years ago. Then during a temporary lull in the last Ice Age, Europe was invaded from the East by people of sapiens stock who, partly by extermination, and possibly partly by absorption, ended the long dominance of Neanderthal man. It is interesting that an inter-species cross may have occurred, as there is some evidence that a Neanderthal-Sapiens mixture has come down to modern times. According to Coon*, one strain of this stock shows itself in the marginal fringes of Europe: in Iceland, in the British Isles, especially in Southern Ireland, in Denmark, and in Norway; another strain would appear to be contained in the globular-headed Alpine component of the peoples of Western and Central Europe.

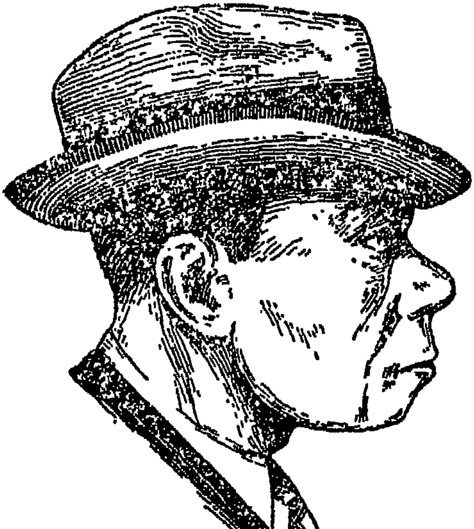

FIG. 2
NEANDERTHAL MAN IN MODERN DRESS*

It forms an entertaining speculation why Neanderthal man should have held the field for so long and should then have gone down so suddenly. A possible answer is that Neanderthal man was physically the stronger of the two species, but that his skill in the manufacture of tools was inferior to that of sapiens man. Thus in the earliest days, before tool-making

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*cf. *The Races of Europe* by C. S. Coon. Macmillan.

became of importance, sapiens man may have been overweighted by his more muscular fellow species; but once tool-making became more advanced the increased food that was available from improved hunting methods enabled the sapiens population to rise and ultimately to overweight Neanderthal man. This view is supported by the skeletal evidence which indicates that the population was substantially higher some 30,000 years ago than it was, say, 200,000 years ago; the evidence would indicate a population about twenty times as high, which is a powerful testimony to the advantages conferred by tool-making.

It is certain that the sapiens men who invaded Europe 30,000 years ago were much better equipped than the men of earlier ages. In particular they had discovered how to make adequate clothes and hence were able to stay on in Europe throughout the advance of the ice in the second phase of the last Ice Age. They lived in caves, and for food they hunted the mammoth and woolly rhinoceros, which were driven south by the advancing ice sheet and hence were to be found in considerable numbers near its edge.

An increasing population is further shown by the development of a social organisation, which is indicated by the ritual burial of the dead, and by magic practices such as the ceremonial arrangement of the bones of hunted animals. The burial of corpses was accompanied by the provision of meat and implements, presumably to assist the corpse to some new existence. Here, then, we have evidence of the belief in survival after death. Corpses were also placed in special attitudes, a practice that has been followed in subsequent mortuary activities, such as those of the ancient Egyptians and those of the modern American mortician. Already 30,000 years ago, man was possessed of superstitious beliefs not substantially different from those that have come down to us today.

Before the period of written history people are classified by archæologists on the basis of the tools they used and of the customs they adopted, in so far as the latter can be ascertained. In many respects this procedure, which is usually regarded as an expedient for overcoming the lack of documentary evidence, is actually superior to normal historical methods. There is much to be said for classifying a people by its techniques instead of by language.

Now the period from 30,000 B.C. to about 10,000 B.C. may be said to be a happy hunting ground for the archæologist*; for this period, which saw the last phase of the fourth Ice Age, was particularly rich in the production of new tools, new ways of life, of art, and of ideas. For the first time, the potentialities of the human brain began to produce outstanding results. As already indicated, the men who produced this flourishing series of cultures were mainly of the sapiens species, although they may have had some small admixture with old Neanderthal man.

A catalogue of the achievements of the early part of the period must include major improvements in tool-making; tools that could be resharpened when blunted; and the use of bone, ivory, and wood as well as stone. There were now furs for clothing, tents made of hides, and mud huts. These men must have been clever hunters, judging by the great piles of animal bones that still survive to testify to their skill.

Steadily, standards of achievement rose until the great Magdalenian culture was attained, the highest achievement of man in his food gathering epoch. Tools were now employed for the purpose of making tools: surely a great intellectual achievement. The edges of tools were sharpened by polishing, and delicate flaking techniques were developed. The bow and arrow, the spear, and the harpoon and hook for fishing were all invented. Bones were no longer discarded but were burned as fuel. At the zenith of these attainments a population level of perhaps one person per square mile was reached, which approximately equals the population density of the North American Indian before the advent of white men.

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*For a much fuller description both of this and of much else in the present chapter see *What Happened in History* by V. G. Childe. Penguin Series.

Equally interesting is the evidence that relates to the social organisation of the Magdalenians. The hunting of large animals required co-operation on a scale something bigger than the family. Trade was carried out over considerable distances, particularly trade in special flints. Magic practices were an important element in Magdalenian life. Corpses were sprinkled with ochre to give them a semblance of life, a practice that survived into the civilised era. There were mystic rites apparently aimed at increasing both human fertility and the fertility of the hunted animals. The special interest attached to these rites arises from the circumstance that they were practised deep underground inside caves, where they were supplemented by remarkable paintings on the cave walls and by sculptures in clay. In recent years, examples of these paintings and sculptures have been discovered in Southern France and Spain. By any standards the craftsmanship is high, so high that it is clear that the Magdalenian cave artists were not just casual amateurs. They were apparently a special class of priest-artist. This is a point of no small importance; for it would seem to be the first case in human history of non-productive individuals being supported out of the food surplus of the general community. These cave artists are the first example of professionalism. They even seem to have had their own schools for the training of new recruits.

In spite of great progress in the development of his resources, Magdalenian man was still dependent on food-gathering. He was therefore powerless against changes of environment that reduced the number of animals on which he was dependent for food. When the ice sheet retreated to the north, zones of tundra, forest, and marshland were formed, thereby causing a large shift in the balance of the animal population. This effectively destroyed the basis of the Magdalenian culture; and magic was not able to prevent it. The Magdalenian culture died and with it a large proportion of the population. Only a remnant managed to survive by taking up residence in the new forests and glades, where they eked out a precarious living.

We have seen that resources are determined by the combination of two factors, human knowledge and the potentiality of the environment. The Magdalenians failed to survive because the development of their knowledge did not keep pace with the change of the environment. In this sense their situation was similar to that of the modern world. In the previous chapter we saw that the exhaustion of high-grade metallic ores and of coal and oil will cause a serious change in the future environment of modern man. Unless our knowledge advances sufficiently to keep step with this change our descendants are likely to suffer the same fate as the Magdalenians, and that in only a few more centuries.

After this aside, let us go back to 10,000 B.C., and follow the remnants of the Magdalenians as they sought a livelihood in the forest glades, and by the sea. Fishing and the capture of wildfowl and small game provided the main food supply. The economy became associated with timber, and as time passed the beginnings of carpentry were made. The dog was domesticated.

But the old population was not left in peace to enjoy even this poor economy. A large-scale movement into Europe of a long-headed, short-statured people succeeded in pushing the descendants of the Magdalenians towards the marginal fringes, where they formed the original population referred to in various legends; for example, this was possibly the oldest of the prehistoric populations referred to in Celtic mythology. They were subsequently to have wave after wave of further invaders superimposed on them, but in spite of this it seems that their characteristics still show through to the present day. It has been seriously suggested that the striking Irish combination of dark hair with deep blue eyes (eyes flecked with gold, not grey), is derived from this source.

It is an interesting speculation as to what ultimately would have happened to the human species if it had been forced to evolve from the culture described above. The likelihood is that things today in Europe would be little different from the old crude timber economy, with its dependence for food on fish and fowl. This culture persisted in some parts of Europe from about 10,000 B.C. to about 3000 B.C. without any great changes taking place, and there seems every reason to suppose that, left to itself, the same culture would have persisted for at least another five thousand years. Had this happened, the Europe of today would indeed have been very different from that we have discussed in previous chapters. So is it possible for humans to remain in ignorance of the potentialities of the resources that surround them. The timber culture was not destined, however, to run the course. It was to be absorbed by a new culture from the East; a culture that was based on the most far-reaching discovery yet made by the human species.

The Great Step

About 5000 B.C. an entirely new type of economy emerged in the Near East. This was based on agriculture; that is to say, on the deliberate sowing of seed and on the tending of crops. The casual gathering of grasses and plants must, of course, have been carried out in much earlier times; the emphasis here is on the deliberate practice of agriculture. To be more precise, the date 5000 B.C. applies to the spread of the economy to Asia Minor, Iran, Syria, Turkestan, and to the Nile valley. It is to be remembered that the climate was then less arid in these regions than it is today.

As a fringe to this development an agricultural economy was gradually spread through Europe, not reaching some parts until about 2500 B.C. The peoples who brought the new economy came in different ways and were of various types. As they pushed into Europe, the older peoples were either absorbed, exterminated, or pushed outwards to the marginal fringes. Notably, there was an invasion by a short-statured farming people who came into Europe by a route that passed north of the Black Sea; these are the so-called Danubian peoples. They reached Central Europe, Greece, and Italy. Another people of similar physical characteristics made their way overland through North Africa, Spain and into France: certain of these people remained in the Nile valley, where they became the ancestors of the ancient Egyptians. A separate people of taller stature, with long heads, long faces, and long noses, made their way by land and sea, apparently originally from Mesopotamia, to North East Africa and thence to Spain and Britain. They were the ancient megalithic people, the people who built Stonehenge.

These particular peoples practised agriculture. But not all of the peoples coming into Europe were so engaged; for example, there also came traders, tall, long-nosed, and long-faced, who travelled by way of Russia and Poland into West Europe. It was probably they who brought blondism into Europe, the others being predominantly dark of hair and brown of eye. These people would seem to have traded in special flints, metallic copper, and shells from the Mediterranean. They it may well have been who first spoke the Indo-European languages.

Now although the new economy is known to have been practised some six or seven thousand years ago in the river valleys of the Near East, the actual discoveries of agriculture must have been made at a still earlier date, for in the first archaeological records the system is already well developed. The economy was already of a mixed variety. That is to say, sundry animals were no longer slaughtered on sight but were domesticated. The provision of clothing had been revolutionised: flax and cotton were grown, and wool was obtained from sheep. Primitive looms were invented, querns were used for grinding corn, clay was moulded and baked to make pots. Bread was made and, since yeast was used in the bread-making, alcoholic beverages were also known.

These developments were based on what today we should regard as very primitive means: stone hoes for scratching the ground, stone sickles for reaping, the horns of animals for picks, polished stone axes for clearing undergrowth. But although we may tend to smile at such crudity it is as well to remember that most of our present major crops were discovered by these people. Modern civilisation has made only minor contributions to agriculture with what had been done by 5000 B.C. We moderns have certainly improved the old methods, but in comparison with the ancient peoples our inventiveness has not been high. It is to them that we owe the very basis of our civilisation. It was they who acquired the knowledge that enabled man to make the great development that the resources of the Earth offered to him. The same opportunities were available to old Stone Age man, but he did not know how to use them.

Now who were these great inventors? Well, with due deference to the dignity of the male, the indications are that it was to women that the main credit belongs. The indications are in part psychological: that men would not be inclined to leave their traditional pursuit of hunting until the merits of agriculture had been more than sufficiently demonstrated to them; and who should do the demonstrating except the woman? To add to this, modern barbaric tribes practising agriculture reckon kinship through the maternal line. This indication of high female prestige is consistently explained by the present suggestion. The notion of women as the *frail inconsequential* sex is a product of easy living in civilised society. The notion that women should be subservient and not trusted with any responsible part in political affairs, as for instance the men in modern Switzerland refuse to allow the electoral vote to their women, would seem to be a further example of a quite arbitrary social convention, not in the least supported by observational evidence.

The village with about a score of separate households formed the unit out of which larger social organisations were constructed. Magic rites once again had a strong hold on the people; but instead of magic being associated with a hunting economy we now find it woven into agriculturalism. Instead of fertility being associated with the birth of hunted animals, the new farmers were concerned with the preservation of the fertility of the soil. The natural cycle of birth in spring, growth in summer and autumn, death in winter, followed by rebirth in spring . . ., was given ceremonial form. To translate into more familiar concepts, the yearly cycle was thought to arise from the influence of a god, or probably more accurately of a goddess; the onset of winter was explained, not as an outcome of the tilt of the Earth's axis of rotation, but as the death of the goddess.

Since the existence of the goddess could not be established observationally, the next step in the distorted reasoning of these people was to choose a human to represent the goddess; the idea being that the representative should undergo, as far as possible in actuality, the same cycle that the goddess was supposed to undergo. So we have the origin of the pagan spring and autumn festivals, festivals that have indeed come down in disguised forms to modern times; and so we have the reason that underlay the sacrifice of human victims: the death of the goddess required the death of a representative. Quaint as these beliefs might seem, they established such an ascendancy over the outlook of the people that they persisted with only minor modifications for more than 5,000 years. As we shall see later, it was the dominance of these beliefs, more than any other factor, that caused the collapse of the ancient civilisations.

Turning now to more rational matters, the enormous increase of human resources conveyed by the agricultural revolution enabled man for the first time to gain an important measure of control over his environment. But in Europe the consequent advantages were to some extent cancelled by two circumstances. Let us consider this next, leaving the consideration of the river valley economics of Mesopotamia and of Egypt until a later stage.

It is natural that the increased food production given by agriculturalism should have led to a marked population increase. This would probably not have been really serious in itself, since primitive peoples appear to understand the dangers of over-population better than civilised man has ever shown himself able to do: in modern primitive tribes special methods have been evolved and practised in order to keep the population at a stable level, and this probably was also done five thousand years ago. But a second factor, when added to the rise of population, produced an inherent instability in the European economy. The new agriculturalists failed to understand the need either for soil fertilisation or for crop rotation. A community would settle in a particular district only for a limited number of years. When the agricultural methods they employed produced a temporary exhaustion of the soil, the community simply moved on to new land. Instead of developing a rooted agriculturalism the early European farmers were really a sort of agricultural nomad; rather like the American farmers of last century. The immediate effect was a rapid spread of the new economy. Eventually, however, no more land was left to spread into, and then the trouble started. Men began to fight among themselves for land. Archæological evidence shows that whereas in the early stages of the new economy there was no preoccupation with weapons of war, ultimately the manufacture of weapons became of prime importance. Now, warfare produced changes of social organisation; and since these changes were of considerable importance to subsequent history, we shall go on next to describe them.

A sharp rise of population must tend to exaggerate local differences: differences of custom, differences of physical appearance, and differences of language. What to begin with were no more than dialects of the same language after a time became separate, mutually incomprehensible, tongues. It was very likely in this way that the group of Indo-European languages arose; probably in the first place among the traders and warriors who, as we have seen, were one of the main groups to invade Europe. Warfare tended to bind together those speaking a mutually comprehensible language into a tribe. Thus instead of communities remaining loose aggregations of small villages there was a natural evolution towards larger assemblies. Not only this, but within the tribe there was a shift in the balance of religious opinion. Gods of war were conceived of in addition to the goddesses of fertility;

and just as the goddesses had been given human representatives, so the gods had to be given representation; but whereas the representative of the goddess had been a sacrificial victim, the proper representative of the god was taken to be some person who happened to be particularly adept in the art of war. In this way arose the concept of a war-chief or tribal leader. Gradually as warfare became more widespread, the gods gained ascendancy over the goddesses, the tribal leaders gaining more and more power meanwhile. Eventually the prestige of the war-chief became so high that he was able to proclaim himself also the representative of the goddess, without running any risk of his being sacrificed at the yearly agricultural festivals. After all, he could always appoint his own representative to stand in for him when the time for sacrifice arrived.

So we see that the ultimate evolution in Europe was into a multitude of tribes, speaking different languages, possessing war leaders of increasing power, and fighting almost incessantly among themselves. It would seem to have been as a result of this evolution that the Indo-European people, who probably were at first traders, not farmers, gradually came to acquire dominance over most of Europe. In this way arose the tribes whose names have come down to us through written history: the Celts, the Sythians, the Germans, the Greeks, the Romans; these were ultimate products of the system.

Accordingly we picture Europe during most of the three millennia before Christ as a turbulent mass of warring agriculturally-nomadic tribes. Repeated invasions of the British Isles culminating in the Celtic invasions were a product of the perpetual disturbances. Each tribe carried with it its own special complement of gods and goddesses. When one tribe overwhelmed another, the victory was represented as the triumph of one set of divine beings over the other. The gods of the defeated tribe were not entirely forgotten, however; they were taken over into a subservient role in the mythology of the victorious tribe. Thus the beliefs of a tribe tended to become overlaid with layer after layer of divinities, the whole structure being determined by the actual defeats and absorptions of other tribes. This is a circumstance well shown by ancient Celtic legend.

So in this seething unrest we shall leave Europe and turn our attention to other places where more remarkable developments were taking place. We leave the European tribes with the knowledge that hardiness and skill in war were being developed to a high degree; a hardiness and skill that was eventually to enable these barbaric tribes to break into the civilisations that were now arising to the south.

The First Civilisations

The new economy brought startling results in the valleys of the Euphrates, Tigris, Nile, Indus and of the Yellow River. In the present section we shall confine attention to the two Mesopotamian rivers only. With the gradual improvement of technique it eventually became possible to drain the lower valleys of these rivers, thereby yielding land of unprecedented richness. Moreover, the problem of land exhaustion that caused so much trouble to the European agriculturalists did not arise, because the periodic flooding of the rivers effectively fertilised the land through the addition of salts dissolved in the river water. Thus these valleys were capable of supporting a genuinely sedentary population of high density. It was on this that civilisation was based.

Productivity was also increased by the discovery of irrigation methods. Indeed so rapidly did resources develop that the general standard of living was able to rise appreciably above the subsistence level. For a time there was a surplus of food. This was disposed of in two ways. First, it was possible to support craftsmen not directly occupied on the land. From these craftsmen came a spate of new discoveries that in themselves tended to increase productivity still further. The invention of wheeled vehicles and of the ox-yoke enabled non-human muscle power to be employed. Bricks were produced for building, the potter's wheel was invented; and, perhaps most important of all, copper was worked. The provision of metal, even of scarce metal, was an important step, since it made possible the production of more durable tools, tools that could easily be given an edge and which could be resharpened. Moreover, copper can readily be melted and cast in moulds, hence allowing the production of vessels of complicated shapes.

Surplus production was disposed of in a second way through the setting up of divine establishments. We have seen how the natural yearly crop cycle became associated in the minds of the primitive agriculturalists with the properties of a goddess, and of how the yearly birth and death of the goddess became translated into human representation. This translation led to the origin of a class of devotees whose job it was to serve the all-powerful goddess. Now, it was customary that the first-fruits of the harvest should be brought to the representatives of the goddess in the autumn: this practice is still observed in the Harvest Festivals of the Christian Church. What was then more natural than that a larger and larger proportion of the food surplus of the prosperous river valley people should be brought as a thank-offering to the goddess; and what more natural than that the company of devotees should grow, so that ultimately a considerable divine establishment was formed?

As time went on, the divine establishments were no longer satisfied with gifts, but came to own land of their own, and they came to employ their own workers and craftsmen. Since copper was expensive, they were better able to afford copper tools than the small farmer. Thus the farming methods employed by the large establishments became more efficient than others, and hence the corporations became wealthier still. What was happening has its parallel in the modern business world where the large firm tends to swallow the small one. Down the centuries the divine establishments came to control a larger and ever larger fraction of the wealth of the community. Partly through this economic control, which enabled them to employ a considerable proportion of the craftsmen, and partly through their religious hold over the people, the divine corporations became at last the effective rulers of these river valley communities. A movement that had started as a thanksgiving for the bounty of the Earth had ended by controlling the whole society. This control had two outstanding effects.

In the first place it prevented the advantage of the sharp rise of productivity being entirely swallowed up by a corresponding rise of population. The divine establishments, with only a small fraction of the total population to support, took to themselves a substantial fraction of the total productivity. Thus even if the rest of the production was parcelled out among the maximum number of people that could be kept alive with it, the total population of the community had perforce to remain appreciably less than the number that might otherwise have arisen if the divine production had also been shared around equally. In bad times the corporations could therefore prevent a collapse of society, since they could disburse sufficient bounty to keep the people alive: the great goddess could come to the rescue of her starving people. In this way the community was able to ride out a temporary series of exceptionally poor harvests. By taking enormously more than their 'fair share' of the total production the devotees of the goddess were able to stabilise the economy. Equal shares all round would probably have produced a collapse in a few centuries, whereas the activities of the divine establishments enabled the whole system to last, from its early beginnings in about 4000 B.C., down to about 3000 B.C.

This temple economy also supplied an important service to human knowledge. Large inventories were compiled to describe the property of the goddess. Since these inventories had to be understandable, not to one individual only, but to the divine clerks in general, writing was invented. The first writing employed a separate picture to symbolise each word, as in modern Chinese. Moreover, since numbers were also required by the divine inventories, and since calculations had to be performed, the beginnings of arithmetic were made. In short, the mystic corporations supplied for intellectual activity what the craftsmen were supplying in the practical field. Nor were these intellectual activities negligible; the arithmetical achievements reached the level of multiplication, an invention that was scarcely to be paralleled in any of the later civilisations of the ancient world. The number 60, which was used as a base by these early calculators, has infiltrated through into modern times in many ways: in the number of minutes to the hour, in the number of minutes of arc to the degree. . . .

It is of interest at this stage to enquire into a deeper issue. Why did the people of this first civilisation not succeed in making the further discoveries on which our modern civilisation rests? They had, be it noted, done so much; they and their forerunners had invented almost the whole of agriculture, in which they had invented the basis of mechanical development; they had invented the beginning of metallurgy; and in the intellectual field they could write and calculate. Compared with what had already been achieved, the further knowledge that would have enabled civilisation to gain an enormous additional momentum was not unduly great; but it was not forthcoming. Instead, the first civilisation was to drift on and on until it broke up about 3000 B.C., presumably as a result of unduly adverse circumstances. From 5000 B.C. onwards there was a steady change of climate. As a consequence, conditions in the Mesopotamian river valleys may well have become steadily less advantageous. The stability induced by the temple economy was apparently sufficient, however, to resist the general deterioration, but evidently was not sufficient to resist some final disruptive influence. This may have happened in a number of ways; there may have been a long sequence of unprecedentedly bad harvests; there may have been plagues of insects that attacked the crops; some physical disease may have struck down the people; there are many ways in which a society that seeks only to preserve the *status* *quo* can be destroyed by an unusual circumstance. The interesting point is not so much the precise events that caused the collapse of the first civilisation—this was inevitable once fossilisation had set in; the question is, why should the addition to knowledge have stopped after such a fair beginning?

The answer would seem to lie partly in the inability of the people to rid themselves of primitive magical beliefs. When the study of astronomy showed that the alternation of the seasons of the year can be adequately explained in terms of the tilt of the Earth's axis, the rational step would have been to discard the old hocus-pocus about the activities of a goddess. This was not done, probably because the very people who were in a position to denounce the old views were themselves profiting enormously from the naivity of the popular outlook. Instead, the divine clerks seem to have become even more addicted to magic practices; for example, astrology became preferred to astronomy.

Perhaps we should not over-emphasise this tendency towards magic practices; for in their early developments both science and mathematics had themselves something of a magical air: it is likely that only people with inclinations towards magic would indeed have conceived of these early developments. Not until recent times did men learn how to distinguish between the general potentialities of science and the charlatanic claims of the magician. Even to Newton the distinction was not clear. It has been fashionable to express surprise that the man who produced the great *Principia* should also have dabbled in alchemy and in the numerological interpretation of ancient writings. If Newton had not had magical leanings, however, if he had not held a strong belief in the possibility of gaining a greater measure of predictability of the future, it is likely that he would never have had the imagination to conceive the enormous scope of the *Principia.*

Let us now come to the second reason why the ancient Mesopotamian civilisation failed to continue the accumulation of knowledge. The vital junction between the work of the craftsman and the achievements of the intellectual was never made, and for a reason that is readily understandable. In the divine corporations craftsmen were allotted a lowly position. Outside the corporations craftsmen, it is true, had a fair measure of independence; but as the corporations gained increasing power the individual craftsman was gradually forced out of business, so to speak; and proportionately to his decline there was a decline in invention. The great period of invention belonged to the days of independence: dependence brought stultification. The divine clerks, on whom intellectual progress depended, had much too high an opinion of themselves to form a partnership on equal terms with the humble craftsmen. So the two stayed apart, and without their combination both became sterile: craftsmen were to descend, first into humble service, and then into outright slavery; intellectual activities were to degenerate into the fruitless pursuit of magical beliefs. So partly from a failure of social organisation, and partly because the brains of the people became caught up in the wrong concepts, this early civilisation, which began with such rich promise, was to come to naught; or more exactly its discoveries were not to bear fruit until they had passed from one equally evanescent civilisation to another over a period of more than four millennia. It was not until the second millennium after Christ that mankind was again to be favoured with conditions as propitious as this first civilisation enjoyed. Fortunately, when the next great opportunity came, the same mistake was not repeated. The favourable path was then taken, not because men came to understand the mistakes of the ancient Mesopotamians, but through a happy conjunction of chance circumstances. This we shall consider in the last part of the present chapter.

To conclude the present section we may note that the error just described has really persisted through to modern times. Even in the face of all the evidence, the modern scientist does not see himself as an equal partner of the craftsman. He erroneously imagines himself, in his heart of hearts, to be a cut above the industrialist and the farmer. Not only this, but, like his Mesopotamian predecessor, he is always prepared to defer to political authority and tradition. It is this characteristic that makes scientists themselves, as opposed to the marriage of science with craftsmanship, so sociologically insignificant.

The Civilisation Cycle

Before we continue the discussion of the river valley civilisations of the Nile, Indus, and the Yellow River, it is interesting to follow the Mesopotamian civilisation still further. We have already seen how this civilisation became fossilised, and how ultimately it was disrupted by some untoward occurrence. Now, once a civilisation begins to disintegrate, disintegration feeds on itself. Men fight amongst themselves instead of engaging in productive activities; farmers can no longer work peaceably in the fields; and plunder seems the surest way to survival. The activities of civilised man are so related to the social organisation, the whole machinery of which is so complicated, that disruption beyond a certain point leads to utter chaos; chaos on a vastly greater scale than could ever have occurred to man in his older nomadic existence, or in the early days of the agricultural economy, or even in the tribal state. This instability is a rooted property of civilisation.

Let us continue these abstract considerations by enquiring into the outcome of a wholesale disruption of civilisation. We ask: what ultimate losses are caused by such a disintegration? Certainly the natural advantages of the environment are not lost: the valleys of the Euphrates and Tigris were just as fertile after the first breakdown of Mesopotamian civilisation as they were before. So a decline of resources could only occur if knowledge was lost. Here we reach perhaps the most important determining factor in man's evolution: knowledge is more durable than a social organisation. A social organisation may be utterly smashed, but the tendency is for the knowledge that has been won to survive. The reason for this is clear: it is very hard to originate a really new idea; in contrast, it is comparatively easy to copy something new; even a slight hint is a great help to making a new step. Now, when a civilisation collapses, enough knowledge usually survives to make it easy for subsequent generations to rediscover anything that at first sight may seem to have been lost. It was in such a way that in the 14th and 15th centuries A.D. our modern civilisation was able to acquire the learning of the ancient world so readily.

The above remarks lead us to a crucial proposition: so long as a civilisation does not collapse through a worsening of the environment, collapse does not lead to any important ultimate reduction of resources. In other words, the disintegration of a civilisation leads to a reduction of population and to the destruction of a social organisation, and that is all.

We return now to the valleys of the Tigris and Euphrates. The collapse of the first civilisation produced a reduction of population, and it smashed the old temple economy, but it did not produce any lasting destruction of resources. It follows that the opportunity was presented for a re-expansion back to the former level of population.

The reformation did not result, however, in a social system with any advantage over the previous organisation. Imagine, first, the emergence of a number of individuals who managed to come out of the chaos better off than their fellows: chaos produces random effects that are certain to throw up a number of particularly favoured people. Then we imagine a process of elimination in the competition for power among these favoured individuals; this process leading in the course of time to a small group that gained effective control of the whole society. In the last stage the struggle continued among this small group, until finally one person or family emerged victorious and controlled the whole of the community. To impress his power still further, the leader took upon himself the attributes of the chief god of the old civilisation, thereby turning any superstitions that had survived the catastrophe to his personal advantage. In this way we reach a social organisation dominated by a pushing, warlike individual, and backed by the old religious prejudices.

It is of course true that this organisation is not the only one that might have arisen out of the chaos. A partial democracy might have grown up with a comparatively large number of prosperous families of equal status living in peace with each other. Such an evolution, even on the face of it, is much less probable than the sort of development described in the previous paragraph. Indeed, so far as I am aware, no democracy of this sort has ever arisen out of a state of social chaos. Democracies have occurred in the world, but they have never immediately arisen from a state of social disruption, as we shall later see.

Now, what happens ultimately to the process of re-expansion? Just as the old divine corporations took an undue share of the total productivity and thereby introduced a tendency towards social stability, so did the new human warrior-god apportion an undue share of the productivity to himself. It would seem, however, that the unfair share of the warrior-god was less than that which had been gobbled up by the temple economy. Hence the new regime possessed a smaller stability factor than the old one. So what was to prevent the new civilisation breaking up as the first civilisation had broken up? What was to prevent the population rising so close to the maximum supportable number that some untoward happening induced the onset of a second disintegration? Evidently there was nothing to prevent such a second disintegration, since population control was not practised. Without population control, the onset of the disruptive phase of civilisation cannot be prevented merely by the extension of resources, although of course the moment of disintegration can be postponed thereby. In the second Mesopotamian civilisation there was indeed some extension of resources and this did serve to postpone the second collapse.

The wider spread of wealth in the early days of the re-expansion created a demand for an economy with copper, gold, and silver as a medium of exchange in place of simple barter, thus providing for a greater freedom in trade. Accompanying this came a demand for a popular writing, a demand that had an important consequence. We have seen how the temple votaries had developed a word-picture system of writing for the purpose of inventory-keeping. This system would no doubt have persisted, as it did in China, had it not been for a fortunate chance. One of the Semitic Mesopotamian groups, the people of the State of Sumer, spoke a language containing a large number of monosyllables, used as words for denoting objects. When the new demand for writing arose, it was noticed that the pictures for these monosyllables could be used as a base. That is to say, instead of using an entirely separate picture for a multisyllabic word, it was possible to denote the word as a series of those pictures that represented the separate syllables. Accordingly, people began to use a limited number of pictures, and to build the multisyllabic words as picture series. This was the first step towards alphabetic language, which was ultimately to develop to the form of writing we now use, as later demands for continued simplification came to be met. Alphabetic spelling would hence seem to be a product of an accidental feature of the language that was spoken by the Mesopotamian inventors of writing.

But these developments were quite unable to increase knowledge sufficiently to provide an important extension of resources. Nevertheless resources were considerably increased for a time. How? By the simple device of seizing resources belonging to someone else. This policy led, of course, to war. Thus we find war spreading among the communities of the lower Euphrates and Tigris, just for the same reason that war became widespread in Europe. The step to war was no doubt a natural one for the successful warrior-gods to take, since the very activities that had carried them to the dominant positions in their respective communities bespoke warlike dispositions. We accordingly find the cities of the Mesopotamian river valleys, the cities of Sumer, Ur, Elam, now trying to snatch the productivity belonging to the others. The ultimate effect of this warlike development was not so much to postpone the break-up of the new civilisation as to add a factor that made its break-up all the more certain; for warfare readily supplies instability to an already overloaded economy. Clearly, then, no permanent solution was to be obtained from seizing the resources of others. At most this policy could yield only a temporary relief. The final collapse was sure.

Thus we anticipate a second collapse of civilisation. This indeed occurred. What then, we may ask, was to prevent the whole cycle being repeated once again? What was to stop a new scramble for leadership, a rising population ultimately overloading the economy, a search abroad for new resources; warfare plus economic instability leading to a further collapse; a new period or reorganisation and expansion . . .? What indeed was to prevent this cycle from being repeated endlessly? Apparently there was very little to prevent it, since in point of fact the history of the next 3,000 years in Mesopotamia and the Near East is simply a history of the repetitions of this cycle. And in this, at last, we reach the most characteristic feature of civilisation: when population control is not practised, the tendency is to fall into a cyclic progression of integration and disintegration. Each cycle contains differences of detail, but differences of detail are far less important than the reason underlying the repetition of the cycle. The main differences of detail are in any case easily understood.

There were, at first, cycles that led to the wars of the Mesopotamian cities among themselves. Then an exceptional war leader managed to secure dominance over all the cities simultaneously. This was achieved by Sargon, the butcher's son, about 2400 B.C. Once such a unification had been achieved, the cycles then worked on a larger scale. Thus, to extend resources still further, it became necessary to look outside the lower valleys of the Tigris and Euphrates. Sallies to the north into the upper reaches of these valleys, and to the west into Asia Minor, eventually reaching the Ægean, were made. The new conquests were easily achieved since the Mesopotamian leaders, possessing superior bronze weapons, readily overcame the scattered populations of the new territories. For a time this policy paid good dividends. The methods of agriculture originally practised in these territories were inferior to the comparatively refined technique of the civilised people. It was therefore possible to increase productivity considerably by the application of the methods of civilisation. For a time it was possible to live on this increased productivity, especially as the new territories were of greater area than the lower river valleys. There was no permanence to be obtained in this way, however. The steady rise of population, not only in the river valleys, but to the north and west also, sooner or later brought about a further disintegration.

When the next period of amalgamation occurred, things were no longer so simple for the original river valley civilisation. The rise of population to the north and west, the knowledge that had been imported—in particular the knowledge of how to manufacture bronze weapons—made the new territories less easy to conquer on the second occasion. Indeed, as time went on, a stage was reached when, during an expansionist phase, the new territories were able to attack and defeat the river valley peoples themselves. It was this process that led to the organisation of Asia Minor under the Hittites and Assyrians, and to the Amorite invasion of Mesopotamia in about 1800 B.C.

A similar state of affairs arose at an even earlier date from forages against barbarian tribes lying still further to the north. To understand the implication of this, it is necessary to say a little about the methods of warfare employed during the period from, say 3000 B.C. up to about 1500 B.C. The use of bronze conferred a great advantage against an enemy equipped only with stone axes and stone spears. Bronze was expensive, however, and was therefore the perquisite of the few; a well-equipped small army was accordingly more effective than a mass of infantry.

In this connection we may note as an aside that the importance of bronze promoted work in metallurgy and would no doubt have had the much-needed effect of raising the stature of craftsmen had it not been for the slavery that was a consequence of the widespread strife between over-populated regions. When one city conquered another, it was a natural development that the conquered people should be taken into slavery, and especially was this so of the metallurgical craftsmen. The effect of war therefore, although it stimulated the development of metallurgy, did not increase the status of the craftsman; rather was this steadily depressed as time went on. We have already stressed that in this lay the crucial error of the ancient world. From the time the craftsman became a slave there was no possibility of the combination of practice and intellect needed for real industrialisation. Civilisation had gone wrong, and there was nothing that could happen except the continued oscillation of the civilisation cycle, until at long last some new factor happened to destroy the sequence. Of this more later.

The relevance of these considerations to the forages of civilised armies against barbarian tribes was that such forages had a high degree of initial success owing to the advantages of bronze swords, spears, and shields against stone axes and bows and arrows. These forages seem to have been carried out partly from a desire for conquest, and partly to gain access to supplies of copper. As a further aside, the latter reason also accounts for the penetration of civilisation to the Ægean.

Now the attacks on the barbarians soon turned out to be a boomerang policy. The barbarian tribes, as we saw earlier, had been gaining much experience of war by hard fighting among themselves. Consequently they were really superior physically to civilised man. It was only the bronze equipment of the latter that gave initial victory. The barbarians soon realised their disadvantages, and, having seen the weapons used by the civilised armies, they were able to manufacture bronze swords, spears, and armour for themselves. It must be remembered that the barbarians were not inconsiderable metallurgists. It was they, not civilised man, who had first discovered the smelting of copper, and it was barbarians also who were later to discover the smelting of iron. The tables were now turned with a vengeance. Barbarian tribes, in spite of their comparatively small numbers, were at no disadvantage against the civilised armies, since the shortage of bronze made large numbers ineffective. Hence the barbarians were able to make highly effective raids into civilised territory. About 2300 B.C. Sargon's empire itself collapsed before barbarians who swept down from the north. Barbarian invasions were henceforth to be of frequent occurrence throughout the whole history of the ancient world.

Before 1300 B.C. the barbarian successes were on the whole of less importance than might be imagined, however. On account of their small numbers the barbarians could readily be absorbed into civilised societies. A complete civilised collapse, such as the collapse of Sargon's empire, was the exception rather than the rule. More usually the barbarians simply pushed out the governing class and took their places, leaving the fabric of society essentially undisturbed, much as the Normans did in Britain in the eleventh century A.D. Still, in passing knowledge to the barbarians, civilisation had introduced a further factor that was capable of turning an already existing instability into a complete collapse.

In the following discussion we shall consider the period from 1500 B.C. separately, because this period differs in degree, although not in kind, from the earlier period from 3000 B.C. to 1500 B.C. The latter period was characterised by repetitions of the civilisation cycle; involving, first the civilisations of the Euphrates and Tigris, and then both the territories to the west and to the north. The process is seen to be one of increasing complexity. The complexity was further increased by developments taking place in Egypt. To begin with, these were effectively separate from the civilisations so far considered, but as the civilisation cycle in Egypt also grew in scope there came a time when a serious overlap with the territory already discussed began to occur. It is therefore of importance that we should give some attention to river valley civilisations other than those of Mesopotamia.

Before going on to discuss these other civilisations it is of interest to remark that the spread of bronze weapons into barbarian territory was not confined to the neighbourhood of the line that separated civilisation and barbarism. The tribes that first acquired bronze weapons not only turned southward towards civilised territory but also carred out attacks further north and west against their barbaric neighbours. These neighbours eventually acquired the use of bronze, and then they in turn attacked the tribes still further to the north and west. So by repetitions of this process a knowledge of the use of bronze penetrated into Europe, reaching Britain probably by about 2000 B.C. This had some effect on productivity, since bronze was used not only for military purposes but to some extent in the making of tools. The effect was not a major one, however, such as was later to follow from the working of iron, since bronze continued to be an expensive alloy and hence was not available for general use by the average farmer.

Other Early Civilisations

There are certain natural differences between the valley of the Nile and those of the Tigris and Euphrates. When civilisation came, the early barbaric people of the Nile valley were neither so concentrated together as to form one natural population centre, nor were they so loosely connected that civilisation started in a number of separate places, as was the case in Mesopotamia. This had the effect of producing a unification, but a unification that was not achieved peacefully. The rise of the first civilisation in Egypt was accordingly associated with the emergence of a war leader. This difference from the Mesopotamian case produced an interesting difference in the tissue of magical beliefs that enshrouded all these early people.

Instead of adopting the temple economy of Mesopotamia, based on the notions of agricultural fertility, the first Egyptian civilisation was already one in which war-chiefs had associated themselves with the gods of primitive superstition. Instead of the first rulers claiming to be merely humble representatives, they already imagined themselves to be the direct descendants of the gods. This difference naturally tended to emphasise the beliefs that related to the nature of death; for the death of a descendant of a god was evidently of more consequence than the death of a divine clerk. The burial rites according to dead kings became more and more elaborate until ultimately the organisation of Egyptian society developed into a vast mortuary economy. Whereas in Mesopotamia the divine corporations had absorbed more and more of the productivity of the people, so in Egypt the mortuary activity absorbed a large part of the energy of the community. The results of this activity have come through into modern times, partly as certain current practices, and partly in the great pyramids, which, under conditions of increasing climatic desiccation, have easily managed to weather the intervening millennia.

Now, just as the affairs of the divine corporations made the invention of writing and simple arithmetic necessary, so in Egypt the construction of the pyramids made intellectual discoveries necessary. In the outcome, however, the Egyptian developments were not as impressive as those of Mesopotamia: the Egyptians never learned to multiply numbers, for example, nor was the potter's wheel developed until a later age.

The Egyptian organisation had a similar obedience to the civilisation cycle. In 2500 B.C. the first civilisation, the Old Kingdom, collapsed; probably from the effect of a number of bad harvests on an over-swollen population. A new civilisation arose after several centuries of chaos. There was again the same expansion, followed by forages against surrounding barbarians. This second civilisation, the Middle Kingdom, was ultimately broken by barbarian assaults around 1600 B.C. A third civilisation, the New Kingdom, was then formed.

It is of interest that the same problems of social development also occurred in the valleys of the Indus and the Yellow River. There was the same rise of civilisation followed ultimately by collapse. The Indus civilisation was exceptional, however, in that collapse was not followed by spontaneous re-emergence. Indeed, civilisation in the Indus valley apparently did not rise again until the territory was invaded by Hindu barbarians from the north. In China civilisation arose again of its own accord. History then followed along familiar lines: forages against surrounding barbarian tribes during the expansion phase followed by inevitable barbarian attacks, which in some cases were sufficient to induce the descending phase of the civilisation cycle.

Repetitions of the civilisation cycle had some interesting consequences, especially in Egypt. We find wealth passing into the hands of an Egyptian middle class with a consequent demand for the mortuary benefits that had formerly been reserved for the warrior-gods. The concepts of heaven and hell acquired currency: it became possible for a man to obtain a passport to heaven for a fee. There were also more rational benefits for the middle class: the law was invented to support the better-off against the poor. Even the craftsmen seem to have profited from the rebuilding that followed the second disintegration of Egyptian civilisation: in the New Kingdom the potter's wheel was introduced, and glass was invented. Craftsmanship did not descend perhaps to the same depths as it did elsewhere, probably because slaves were not so easily acquired as in the civilisations of Asia Minor and Mesopotamia.

The chief importance of the developments in Egypt was not the extension of knowledge, however, but the introduction of a complicating factor into the world situation. By 1500 B.C. an interlocking civilisation had been built up, stretching from the Nile valley, through Palestine and Syria, Turkestan, thence to the river valleys of Mesopotamia, and beyond through Iran, reaching eventually to China. Of these we may distinguish three main groups: the original Mesopotamian valleys, the newer organisations of Asia Minor, and the Nile valley. Each of these groups by 1500 B.C. possessed a productivity and population sufficient to operate a civilisation cycle of its own. The three civilisation cycles were no longer separate, however; the functioning of one of them affected the operations of the others. The complexities that could arise were therefore much greater than in earlier times. It was possible for the three cycles to become interlocked in phase, so to speak, when for a time there would be either an enormous universal resurgence of strength and activity, or an entire disintegration leading to world-wide chaos. But more frequently the three cycles worked out of step with each other, thereby causing highly complicated configurations in which a temporary resurgence would arise in one place and a temporary collapse elsewhere, the whole evolution proceeding in a well-nigh unpredictable manner.

Disaster

This was the situation when a new technological advance came along to smash the civilisation of the Old World beyond repair. This was the first really major technological discovery to be made since the early days of civilisation. It was a discovery that belonged to the barbarians, not to the befuddled wits of civilised man. About 1500 B.C. an Armenian tribe found out how to smelt iron ore in a cheap practicable way. The results were to permeate all man's activities.

In the first place, a suitably worked iron sword is enormously superior to a bronze sword. Secondly, high-grade iron ore is much commoner than high-grade copper ore; hence iron could be made available in large quantities. Thus the discovery of iron, besides enabling a fighting man to be much better equipped than before, also enabled comparatively large numbers of men to be so armed. The heyday of the Bronze Age knight, who had been able to cut down poorly equipped infantry with great dispatch, was gone. Henceforth clashes between armies were to be on a much increased scale, and henceforward the skill of the common soldier was to count for more.

The discovery of iron also had important peaceful consequences. It was now possible for every craftsman to possess a set of cheap iron tools, and for the first time the farmer could make really effective use of metal. We have seen that bronze was so expensive that, except in so far as it was practised by large institutions, agriculture had been essentially a Stone Age culture. The discovery of iron-smelting changed all that. The resulting increase of productivity favoured especially farmers who operated outside the lower river valleys. In the lower river valleys cultivation had already been on an intensive scale for several millennia. Consequently, when iron became available there was less room for improvements in the river valleys than there was in the much wider areas of comparatively undeveloped land outside. Hence future developments were to take a direction that accorded less importance to the original river valley civilisations, and more to civilisations based on wider territories.

The first civilisation to benefit from the use of iron was based on the wider territory of Asia Minor. The Hittites stumbled across the discovery of iron, and, realising its importance, managed to keep the smelting process secret for some centuries*, thereby enabling their armies to reap the full advantage of the new weapons. By this secrecy, which parallels modern secrecy concerning atomic warfare, the Hittites were readily able to suppress their competitors and to impose their own civilisation cycle on the peoples to the east and south. By snatching the resources of others they were able to expand for a time without inducing social instability. But success bred laziness, and soon the Hittites, instead of doing their own fighting, which in any case should have been easy in view of their monopoly of the production of iron, took to the employment of mercenaries. It was through the mercenaries that the secret of iron-smelting ultimately leaked out.

Then the fat was in the fire. Soon rival armies to the south and west were also equipped with iron weapons, and the interlocking of the civilisation cycles began in earnest. Moreover, civilisation made the same mistake with iron that it had made with bronze. Civilised armies attacked, and at first conquered, surrounding barbarian tribes. The result of this was inevitable. The barbarians discovered the means of producing iron, armed themselves, and poured in wave after wave on to a civilisation that was already in its death struggles. So came the Medes, Persians, and Chaldeans of biblical memory. It is true that every now and then the interlocking civilisation cycles would slip in resonance with each other and there would for a time be an enormous resurgence of activity. The Assyrians, by conduct of unparalleled brutality, forced the cycles to come into step when they conquered territory ranging from the Nile to the Tigris about 700 B.C. The Persian Emperor Darius, about 550 B.C., likewise impressed his rule from the Nile to the Indus. But the occasions on which effectively the whole of civilisation was brought into step were rare. When the major civilisation cycle imposed by Darius, for example, reached breaking-up point, all coherence was lost and in the re-emergence a multitude of interlocking minor cycles were set up once again. Accordingly, we see that the millennium before Christ was in the main a millennium of chaos. There were, however, occasional periods of order in which a fair degree of world-wide organisation was imposed by the violence of some exceptionally successful conqueror.

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*The Hittites only prevented a knowledge of iron-smelting from spreading south and east into civilised territory. An outward spread, north and west, apparently occurred; evidence of early iron-working has been found, for example, in the Danube valley.

It is a matter for guesswork how long this unrest in the Old World might have continued had it not been stopped at long last by a rising civilisation in the Mediterranean basin. The discussion of this civilisation forms the subject of the next section, so we shall conclude the present section by considering an intellectual development that came out of the chaos just described. This was the only important product of the final phases of a once great civilisation.

Now, although the discovery of iron was of assistance to the average man in providing him with cheap tools, the general effect of the unending turbulence that boiled up in the ancient civilisation more than compensated for this advantage. Nor was it just the poor man who suffered. The uncertainty of life was so great that a family might live in great wealth and enjoy great power for half a dozen decades, only to then fall into distress when their society was trampled down by some other community. Thus, for the first time since the onset of civilisation, a considerable proportion of mankind came to experience a high degree of misery. The effect was to create a sense of fellow-feeling among the oppressed.

Now one people, the Hebrews, were under-dogs throughout most of the millennium before Christ. These people as a result of their continued misfortunes came to believe in a system of religious compensation. We need a digression to understand how the relevant ideas arose in the Hebrew mind.

An effect of the warring of one group against another in the ancient world was to cause great religious confusion. We have seen how, after the collapse of the first civilisation, the war leaders that arose in the next civilisation took on themselves the characteristics of the former gods. Thereafter, whenever one group defeated another the victorious party imposed its religious beliefs on the losers, just as the warring tribes in Europe were doing at the same time; but the divinities of the vanquished were not entirely suppressed; as in Europe they were accorded a minor rôle in the combined mythology of victor and vanquished alike. In this way, warfare tended to increase the religious complement of a people: the religious pantechnicon of gods and goddesses switched around in correspondence with the military performances of the community. So long as this happened slowly it caused no serious psychological misgivings. After 1000 B.C., however, changes came so thick and fast that bewilderment could not be avoided. What were people to believe? It must be remembered in this connection that, absurd as we realise the old religious concepts to have been, these concepts could not have exercised their undoubtedly great influence if they had not been very firmly believed.

Now a person cannot relinquish a firmly held belief without suffering a considerable degree of mental stress. How then were the people to protect themselves against frequent repetitions of this condition? The solution adopted by the Hebrews was one of simplification. Realising that there was something very suspicious about all these changing groups of gods and goddesses, the Hebrews conceived the idea of one god: not merely a supreme god, but one god only. The other gods were not even accorded a minor rôle, they were classed as outright impostors—'There is none other God but me'. The Hebrews did not countenance the view that all the gods might be impostors; and there was a very good reason why they did not do so. The Hebrews had need of a god, and one god suited their purpose better than several would have done. Instead of asserting that the one god was their god, they asserted that the one god had power over all people, and that the god had chosen them as his own special people; presumably on account of their suffering and humbleness. In this respect it may be thought that they were making a virtue out of necessity, since indeed the Hebrews had very little opportunity in the nature of events to be anything else but long-suffering and humble. On the rare occasions when fortune smiled on them, they seem to have possessed no greater ration of these special commodites than anyone else.

If the Hebrew philosophy had stopped at this point it would very likely have had little influence on later ages; but something else had of necessity to be added to it. Why, if the one and only god had chosen them as his special people, should he not suppress their tormentors, the Egyptians to the south, and the Assyrians and Babylonians to the east? The answer was a remarkable one: because of their lack of virtue. When they were oppressed, they said that the god had forsaken them because of their iniquities. When the oppressors collapsed, for some sociological reason, they said it was the god who had come to their rescue. Ultimately, when atonement for their sins was complete, the god would smite their enemies once and for all; the Messiah would come;

and they, the Hebrews, would finally emerge victorious over all other peoples.

This Hebrew discovery of moral introspection has had a great influence on later ages. This it has been that has in part served and in part bedevilled our modern civilisation.

There are still some people nowadays who would object to the above interpretation, since certain of the beliefs of the Hebrews have come through to modern times. Any objection to the above argument is perhaps best met with a question: if the development of the idea of one god was not a result of a general social situation, why is it that at the time, about 600 B.C., when Amos, Hosea, and Isaiah were expounding this doctrine in Israel, essentially the same doctrine was also being put forward by Buddha in India, by Confucius and Lao-Tse in China, and by Zarathustra in Eastern Iran? The approximate coincidence in time is too striking to be dismissed as chance. After more than 4000 years of belief in the gods of primitive barbarism, there suddenly appears, in places as widely separated as Israel and China, the belief in one almighty god, the god who is 'father of us all'. We may note in this last phrase an echo of the sublime descent of the human warrior-gods.

The Rise of the Mediterranean Civilisations

It was mentioned above that in the search for copper the river valley societies carried civilisation westwards to the Ægean islands. This movement began as early as 3000 B.C. During the second millennium B.C. the flourishing Minoan civilisation was established in the island of Crete and extended thence to the Greek mainland. This civilisation was, however, marginal to the civilisation already described.

There was a fair measure of trade between Egypt and Crete, between Crete and Asia Minor, and from Egypt by sea up the coast of Palestine and Syria. This trade attracted pirates who were based partly on the Ægean islands themselves and partly on the coast of Asia Minor: the city of Troy, for example, seems to have been largely a nest of these pirates.

Now, about 1800 B.C. a barbarian tribe, speaking an Indo-European language, moved from the north into Greece, where they came in contact with the Minoan civilisation. By about 1400 B.C. these hardy tribesmen had thrown off the initial dominance to which they were subjected, and had in their turn become the rulers of the mainland and of the islands. Civilisation then wilted locally for a time, but only for a time; in the next thousand years or so these Greek barbarians were to lift the ancient civilisation to its ultimate climax.

The Greek forages against the Trojans, later to be immortalised by Homer, belonged to the early days before the coming of iron. This little war was very likely conceived of as a raid for plunder, for pirate's treasure. Homer when he wrote of the beautiful Helen was no doubt claiming a justifiable poetic licence. The story brings out the tactics of Bronze Age warfare. We see the outcome as being decided by the personal battles of well-armed knights. Armour was important plunder, reflecting the high cost of Bronze Age military equipment; and the descriptions of shields with multi-layers of metal and hide could only be applicable to the days before the diffusion of iron. Homer himself wrote at a later date, after the coming of iron, perhaps about 900 B.C. It is important to realise that although Homer writes of the Trojan war as a great epic drama, it was in actuality no more than a tiny ripple on the dark stormy waters of the age.

The ultimate rise of the Greeks was assisted by two factors, one of a deep-rooted psychological nature, and the other a fortunate practical chance circumstance. The Greeks were the first barbarian tribe to acquire civilisation without being absorbed by it. Greece was so far away on the fringe of the Old World that the Greeks were able to pick up civilised practices almost when and how they pleased; and in doing so they brought an independent outlook to bear. Particularly, they were not overwhelmed by the religious concepts of the Old World.

Next let us look at the practical factor. After about 800 B.C. an important change came over Greek economy as a result of the increasing disruption of the Old World civilisation. It became increasingly possible to export a multitude of small manufactured goods, goods that would have been produced elsewhere but for the instability of the times. The Greeks profited from the sea that lay between them and the troubled areas, just as Britain has profited from the sea that separates her from Europe. The Greeks profited in fact just as a neutral can profit in a modern war. But whereas a modern war lasts but a few years, the disturbed conditions in the Old World lasted for a millennium. It was on this circumstance that the first of the Mediterranean civilisations was based.

These remarks may possibly seem to be in contradiction with some historical studies of ancient Greece that have sought to emphasise the occasions on which the Greeks were called on to repel invasions from the Old World. On the occasions where some exceptional conqueror rose to power, the Old World did indeed seek to extend its influence to the west, but in the main the Old World civilisations were too busy fighting one another to bother much about the distant Greeks. The parallel with Great Britain is a good one; in the modern era the English Channel has prevented the British social structure from being disrupted by invasion, but it has not prevented Britain from sometimes being involved in war. Apparently there has been too great a tendency to take Greek epic literature at its face value. We have seen that Homer exaggerated the minor Trojan scuffle into a major war; and this trait was handed down to other Greek writers. By and large, Greece was little touched by external war.

Now what started as the export of cheap goods gradually became reinforced by higher-class ware. The Greeks learned the beginnings of their art from the Minoan culture. Then they went on to greatly extend this early learning. Artistic standards gradually improved until ultimately the Greeks were producing the finest wares of any to be found in the world: a truly remarkable development in a people that only a few centuries before had been at a semi-barbarian level of culture. Greek art as a whole derived its force from this commercial connection, rather than from abstract concepts.

So, as the centuries passed, Greece evolved into the workshop of the ancient world. The implied analogy to the modern economy of Great Britain is, as we shall see later, a surprisingly close one. The population of Greece rose in correspondence with the increasing prosperity. The factory system was incorporated into the economy. Small manufacturers increased their scope so that initially hard-working families became highly prosperous. Such people then ceased to work themselves, preferring to employ labour or to buy slaves. In this way a fairly extensive wealthy class came into being. Now, as we have already noted, the Greeks were never deeply immersed in the old ways of life: they lived on the fringes of the old civilisation, not at its centre. In consequence their social organisation did not take on the typical warrior-god structure. It is of interest, for example, that the gods and goddesses of the Old World seemed to hold more a poetic than a religious attraction for the Greeks. Indeed the Greeks seem to have welcomed the very complexity of the overlapping religious structures that had been piled together by violent clashes within the Old World. It was on this that their beautiful mythology was founded. What had been a matter of deadly earnest to the older civilisations became a basis of a wonderful literature, and an excuse for public holidays. So can folly be turned to profit.

As a consequence of their conceptual independence the Greeks were able to build a social structure according with their own inclinations. The various prosperous families, coming as they did from peasant stock, maintained a natural independence of outlook, so that an organisation starting as a loose confederation of small farmers gradually evolved into a democracy of prosperous manufacturers*. Here again we have a parallel with nineteenth-century Britain. Moreover, whereas Britain in her prosperous days had a mass of wage-slaves without electoral vote, so in Greece there was a large number of out-and-out slaves: it is estimated that by 500 B.C. the Greek slaves were in greater number than the freemen*.

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*These remarks refer essentially to Athens and to a few of the other large cities. Oligarchy was practised in many of the smaller cities.

The parallel with Great Britain was even closer still. By 450 B.C. the Greek population had swollen to about four times what Greece herself could feed; the balance of food being imported. The inevitable tightness in the economy had for some time been partially alleviated by a colonisation of the surrounding fringes of the Mediterranean. When this policy no longer sufficed to provide an adequate outlet for the rising population, the strain led to one Greek city attacking another. Athens, particularly, carried out systematic attacks on surrounding weaker cities; the citizens of Athens seeking thereby to maintain themselves by snatching the resources of the other cities.

It was at about this time that Plato wrote his *Republic*, wherein he sought to lay down the manner in which an ideal State should be constructed. The special point of interest is that, like many modern political commentators, Plato attributed the troubles of his time, not to basic economic factors, but to the social organisation of the Greek State. In ignoring the one really important issue—the ratio of productivity to population—Plato made the same error as those moderns who spend their efforts in discussing the relative merits of Socialism and Capitalism.

Gradually the major Greek cities fell into a general decline. A psychological malaise became widespread, just as it is doing in Britain today; until ultimately Hellenistic barbarians from the north were able to secure dominance over the whole Greek mainland. The access of vigour derived from the consequent social changes then led to a further expansion abroad—an expansion designed to extend Greek resources. By 330 B.C. the resurgence was sufficient for Alexander to proceed to his remarkable conquests of Egypt, Syria, Iran and thence into the Indus valley—the old civilisations being in no condition, after their long strife, to resist the newcomer. Alexander's conquest left Greece with an extensive colonisation of the Mediterranean basin, and it was on this extension of Greek resources that the second expansive phase was continued. This phase, although it lasted little more than a single century, holds an incommensurately large place in history, since it yielded a fairer crop of intellectual triumphs than had been garnered throughout the whole of the preceding 3,000 years.

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*It has recently been questioned whether the slave population was as high as this.

The work of Euclid, written about 300 B.C., is a well-known example of these achievements. The schoolboy's geometry book stands as Euclid's imperishable monument, but I would rather measure Euclid's perception at a more subtle level than this. In the axioms on which his geometry is based Euclid includes the famous parallel axiom*. Now, to most people the truth of this axiom seems self-evident. So why bother to list it as an axiom? This question was not answered by our modern civilisation until almost the middle of the nineteenth century A.D., when it was at last realised that the axiom is quite genuine: it can be denied without any inconsistency arising. Indeed, it seems to have taken more than 2200 years for the full depth of Euclid's procedure to become properly appreciated.

Perhaps the greatest of the Greek mathematicians was Archimedes. His achievements are not to be measured in terms of school geometry: they come into a province that can only be understood by the trained mathematician. Nor did the feats of Archimedes stop with mathematics. He was the first man to develop the science of hydrostatics in quantitative form. He constructed the first scientific measuring instrument, thereby showing his perception of the basis of scientific method—the combination of abstraction and observation. Had circumstances been propitious this latter step might conceivably have been a turning point in human history.

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* 'Through any point, not on a given straight line, one, and only one, straight line can be drawn that does not meet the given line.'

Archimedes and his friends had no doubts, such as were widespread in the 15th century A.D., of the spherical shape of the Earth. Eratosthenes actually succeeded in measuring the size of the Earth with an accuracy that was surprising in view of the methods that he was obliged to employ. Aristarchus understood and proposed the system of planetary motions that nowadays we associate with name of Copernicus. Hipparchus extended the astronomical observations of the Old World, and thereby lifted the observational study of the heavens to a level that was only to be excelled in comparatively modern times.

In the mechanical field remarkable results were also forthcoming. Water-clocks and pumps were invented. The latter had perforce to remain a toy, since iron pipes were not then available to stand up to high pressures, otherwise the practice of irrigation might have been revolutionised. The cutting of metallic gear wheels was also an insuperable engineering problem at this date. In the practical field rotary corn mills driven by donkeys were constructed. The invention of the rotary mill is particularly noteworthy since it represented the first really important use of mechanical methods since the construction of the potter's wheel some 4,000 years before. So slow can man's inventions be when his brain is controlled by unfavourable concepts.

For the first time in 4,000 years the Hellenic expansion thus created the opportunity for the union of intellect and practice that could have revolutionised man's resources. The opportunity was not taken. It is usual to attribute this to the slave system, which reduced the need for labour-saving machines. Although we may admit this suggestion as a contributory factor, I do not think it constitutes the main explanation, since the Hellenic expansion was in any case too short-lived to make any really effective steps towards a machine age.

By 200 B.C. the Greek economy was disintegrating; the inscription from the Rosetta Stone, carved in 196 B.C., reads:

> heavy taxes, accumulations of arrears and resulting confiscations, prisons filled with criminals and debtors, public and private, numerous refugees scattered over the country living by robbery, compulsion applied in every sphere of activity.

This refers explicitly to Egypt, where conditions were worse than elsewhere. But Greek civilisation as a whole was decaying if not collapsing disastrously. A crucial manifestation of the decay was a general weakening in the protection that Greece was able to give her Mediterranean colonies. This gave a rival people to the West, the Romans, an opportunity they had long waited for. The Romans were allowed to mop up the Greek colonies one by one, so that, while Greek power declined, Roman strength increased. It increased until ultimately Rome was even able to overweight Greece herself. Thus Greek civilisation was not destroyed at one blow, it was swallowed piecemeal.

Now before we consider the Romans let us take some note of the trend of population levels over the several thousand years of the existence of civilised man. We have repeatedly spoken of rising populations. Let us consider quantitative estimates as best we can. The villages of the early European agriculturists contained only about 30 households. The city of Ur in 3000 B.C. covered about 200 acres; the populations of the cities of Mesopotamia might have been as high as 50,000 people. In 1500 B.C. Assur, the capital of Assyria, covered 120 acres. For comparison the area of Troy was only about 4 acres, which indicates the minor character of Homer's war. The population of Athens in 500 B.C. was about 300,000, emphasising the enormous growth of the Greek civilisation. Colonial Greek cities usually covered about 200 acres; Alexandria in 100 B.C. covered 2,200 acres, Alexandria in 100 A.D. covered 2,250 acres; Rome in 100 A.D. covered 3,600 acres; colonial Roman cities were from 50 to 500 acres in area.

To come now to the Romans: they, like the Greeks, were descended from an Indo-European barbaric tribe; a tribe that seems to have come down into Italy from the north. The Romans probably encountered civilisation from a people that migrated from Asia Minor to Italy, possibly owing to the Iron Age disturbances that were engulfing the Old World. These people may have been the mysterious Etruscans referred to by the Roman writers*.

Equipped then with the Iron Age economy there was a rapid expansionist programme. As a result of this expansion a number of wealthy families emerged. Competition among them must have been more severe than in the corresponding Greek case, presumably because the Romans at this stage did not possess a lucrative trade with the Old World. Consequently the wealthier were fewer in number than in the Greek State, and so, although there was some outward form of democracy in the early days of Rome, it was a democracy that effectively included in the Government an even smaller percentage of the population than was the case in Greece. It was accordingly possible for the Roman social organisation to pass readily from a semblance of democracy to the war-chief complex. Indeed no really violent disturbance was necessary to induce this change: the natural competition between the few influential families was sufficient to produce such an evolution.

The Roman expansion soon ran the economy into a strained situation. In the century from 500 B.C. to 400 B.C. there seems to have been as many as six separate major famines. These were not sufficient, however, to induce a totally disruptive phase of the Roman civilisation; but the repeated small disturbances were sufficient to promote a desire for colonial expansion. But so long as the Greek civilisation remained strong, the coveted Roman expansion towards the civilisations of the Old World was barred. So we see that the Greek collapse provided a long-sought opportunity. Rome seized the opportunity, and Greece did not rise again.

In spite of us moderns being perhaps more familiar with the Roman civilisation than with any of the other civilisations of

*There is serious uncertainty in this.

the ancient world, the Roman outlook is shrouded with deep mystery. Almost every Roman characteristic seems to be turned inside out; to be the opposite of what might be expected. In the first place, the Romans were remarkable, not for their abstract achievements, but for their utter lack of them. Where the later Greeks had lifted man's knowledge by an almost incredible degree, the Romans not only failed to extend this advance but they even seemed incapable of preserving what had been gained. Possibly the explanation was that the ignorant Romans found themselves in contact with highly educated Greeks, and that a sense of inferiority caused them to develop a contempt for theoretical knowledge, thereby destroying their own potentialities for abstract thought. This explanation is supported by the very considerable Roman literary achievements. Thus, since the outstanding Greek literature belonged to the first Greek expansion, not the second, it seems probable that the Romans were not brought into contact with Greeks of great literary power, and that accordingly they were not impelled to develop the same contempt for literature as they did for abstraction.

It is true that much of Roman literature seems to be of an imitative nature. Indeed the modern judgment is that the whole of Roman artistic achievement lacked the outstanding flair shewn by the Greeks. Against this judgement, it should be noted that classical studies have tended to begin history with the Greeks; hence the Greeks have been accorded credit for inventing the whole of their literature and mythology. This was not so. The Greeks in fact drew heavily on the older civilisations, just as the Romans drew on the Greeks.

The peculiar qualities of the Romans mainly showed themselves, however, in matters of social and military organisation. Instead of rapidly degenerating through soft living, as had all the prosperous civilisations of the Old World, they consistently carried aggressive war deep into barbarian territory. One adverse experience, the sacking of Rome by the Celts in 390 B.C., seems to have persuaded them not to become a chopping-block for the northern tribes. They hammered the barbarians right and left, pushing far into Europe; ultimately as far as Britain. What was novel in all this was that apparently the Romans were able to profit from their mistakes.

Colonisation of Europe served Roman expansion well. It helped to diffuse Iron Age agricultural economy, thereby increasing Roman resources. Productivity was also further increased by the invention of the plough. This decisive step went again to the credit of the barbarians, the invention being made about 100 B.C. by a Germanic tribe. Of particular note, the Romans brought to an end the seemingly endless strife that had racked the Old World for more than a millennium. By force of arms they imposed peace. Now, it might appear that with the coming of peace there was a new opportunity for a resurgence in the Old World; a resurgence that might ultimately come to dominate Rome herself. But a resurgence never came. Rome was not to be seriously challenged by the East. There was to be no later Darius to raise a great and overwhelming power stretching from the Nile to the Indus.

Now, it is of interest to enquire into this more closely. Why did civilisation swing so decisively to the West away from its old centres? The answer to this would appear to be partly in the Iron Age economy itself, which enabled a greater productivity to be obtained from the large open areas of the West than from the confined river valleys that had cradled the first civilisation. This was not all, however. The climatic changes that had been going on since 5000 B.C. were having an increasingly desiccating effect on the territory of the Old World. Thus not only were the resources of the West much increased by the Iron Age economy, but the resources of the Old World had been steadily decreased by climatic change. The rise of the West would seem to be due to these circumstances. Indeed the Old World was never at any time to rise again to real dominance, since the desiccation was to continue even further during the Christian era.

Let us come now to the outstanding feature of the Roman civilisation: that expansion did not lead to the disintegrating phase of the civilisation cycle. The strain of excessive population was more than compensated by the system of 'unfair shares'. We have seen that, already in the early days, a small propertied class had emerged. This class evolved into the Roman aristocracy, which took to itself an increasingly large proportion of the total productivity. The stabilising effect of such a social system was enhanced by the increased productivity which, as we have already seen, arose from the diffusion of the Iron Age agricultural economy into Europe. Instead of the Roman civilisation becoming ultimately weakened by a series of bad harvests, which in any case were less likely to happen in the widely spread Roman territory than in the confined areas of the old river valley civilisations, the Roman social organisation became more stable as it went on.

A price had to be paid for this stability, however, since beyond a certain stage the system of 'unfair shares' tends to promote inefficiency. Thus, once the population level becomes forced down to considerably less than might be supported, there is no strong incentive to maintain efficiency. This happened in the Roman case. By about 300 A.D. so much of the total wealth had accumulated into the hands of the few that the population began to decline quite sharply. Now since, as a general rule, a rural population tends to maintain a roughly constant level, a rise of population mainly shows itself as an increase in the size of the cities, and conversely a falling population shows itself as a decline of the cities. This is what happened to the Roman civilisation. An increasing proportion of the people became employed on the rural estates of the wealthy. There was a general shift of the population from town to country. At last it became difficult for the state to obtain soldiers for the army and craftsmen for the building of military equipment. What at one time had been an extremely strong central organisation gradually withered away, and in its place there grew up, not only in Italy but throughout Western Europe, a system of large wealthy households maintained by the labours of the poor. The feudal system had been born.

Now, such a social organisation was possessed of so great an internal stability that it must have continued for a very long time if it had been left to itself; but the Roman Empire was subjected to incessant attacks from its eastern barbarian fringe. So long as the central organisation remained strong, the barbarians were beaten back without difficulty by the skilled Roman army. Even for a long time after the onset of decline in the central organisation, the centuries-old tradition of fighting enabled the barbarian flood to be held back, but sooner or later the defensive wall was certain to break. It did so about 400 A.D.

The collapse of the Roman Empire is often attributed to social degeneration. This term, if it is to mean anything, must be interpreted in a biological sense, and then it becomes a truism. The word 'degeneration' cannot properly be infused with moral implications. To emphasise this inapplicability, it is of interest to notice that the same development that caused the Roman collapse was the very factor that prompted the rise of modern civilisation. Had Rome remained strong, it is likely that the intellectual steps that formed the basis of modern civilisation would never have been taken. We have had ample evidence to shew that these steps were not inevitable: to implement them some quite unusual configuration of circumstances was necessary. The requisite circumstances were ultimately forthcoming, partly from the Roman invention of the feudal system, and partly from the religion that the Romans finally adopted in order to maintain it. These factors were passed on after the Roman collapse. Before we discuss subsequent developments, it is important to outline the origin and development of the religion just mentioned.

The rise of, first, the Greeks, and then of the Romans, introduced a new factor into the Semitic world. No longer were the various Semitic communities able to take it in turn to be top dog: they were suppressed, all of them *en bloc*, by alien conquerors speaking strange languages. It was therefore natural that more and more persons of Semitic extraction should turn towards the philosophy that had been worked out a few centuries earlier by the Hebrews: just as this philosophy was specially suited to the Hebrews in their days of adversity, so the same philosophy became attractive to Semites in general. In the outcome, there was a large movement away from the old religions, and there was a correspondingly large addition to the Hebrew faith: the old Semitic peoples tended to disappear and the Jewish people was born. This metamorphosis was accompanied by a great activity within the Jewish Church. The rapid increase of their influence seemed to go to the heads of the Jewish leaders. They began a long struggle among themselves for power, a struggle that was to lead to the major disruptions that ultimately caused the Jews to become scattered over the whole civilised world.

These internecine struggles had an important bearing on the inception of the Christian religion. To understand the origin of this religion we must consider a further point. With the coming of the 'Roman peace', war between one community and another came largely to an end; but an age-old legacy of pillage and murder remained to bedevil the relations of one man to another. Accordingly, the question of neighbourly behaviour came in for much discussion; and the discussions were especially fervent among the Hebrews, the world's ethical specialists. It was into this atmosphere that Jesus was born.

Four probable characteristics of Jesus may be mentioned: the crystallisation of beliefs that were 'in the air', a strong anti-clericalism, the popular appeal of his teachings, and a determination to stick to his guns. In the prevailing atmosphere of religious intrigue such a man must necessarily have walked in fear of his life. The Jewish authorities eventually decided to mark him down; and the tension mounted until the unrecalcitrant Jesus was left with only the goodwill of the people to stand between him and his sanguinary opponents. The end was therefore certain as soon as the first temporary lapse of popular esteem occurred.

For a while after the murder of Jesus the only adherents to his teaching were a number of personal friends and supporters—the disciples—and in the ordinary course of events the ethic of Jesus would have died away and become forgotten; just as the teachings of hundreds of other social reformers have become forgotten. That this did not happen would appear to be due to two main causes.

The first of these causes was an outcome of the strife that had been steadily mounting within the Jewish Church. After a time one group apparently perceived that their status might be enhanced by resuscitating the doctrines of Jesus. This policy seems at first to have paid good dividends, judging by the energetic manner in which it was pursued. The life history of Jesus was written up; the disciples were consulted and accounts obtained of his sayings and doings. This information provided the human traits that can still be discerned in the Gospels, despite much overwriting by later authors.

The next step seems a remarkable one to the modern mind. It was decided to deify Jesus. This step converted the ethic of Jesus into the Christian religion. Now it must be remembered that the making of a religion was a commonplace procedure in the ancient world: probably upwards of a thousand religions had been manufactured during the previous four millennia. The implication of a mass-production process is not inappropriate, since the formula for religion-making was a standard one: it was simply the old warrior-god prescription. This, indeed, was the prescription that made the Christian religion.

At first sight Jesus was an unpromising subject for the application of the warrior-god formula, but the Jewish writers managed to make a surprisingly good case of it. We can readily follow the working of their minds. To correspond with the warrior requirement, Jesus, now the Christ, was identified with the Messiah, the conqueror who was to come to liberate the Hebrew people. The obvious objection that in fact Jesus had not liberated the Jews was answered in the following terms: that the Jews could not be liberated until their atonement was completed; that the Messiah had come for the first time to proffer advice whereby atonement should be completed; that when atonement had been completed the Messiah would come to them for a second time; and that he would then come in his true guise of a conqueror. Hence we see the need for the claim that the Christ would come again.

Let us come now to the application of the other part of the formula—the descent from the god. To make this step as strong as possible it had always been desirable for a conqueror where possible to claim the god as an immediate parent. The Jewish writers, boggling at nothing, made exactly this assertion. Once again there was a difficulty, however; for, unlike the majority of the religions of the Old World, the Hebrew god could not be given human shape, which made it awkward to explain conception in a normal biological manner. Since the time of Isaiah, the Hebrews had asserted that the one god could not be represented as a graven image, not even as a human image. This belief was so deeply held that there was no possibility of going back on it. Some device was needed. What? The answer was both bold and outrageous—virgin birth; and to avoid the criticism that virgins are not normally observed to give birth to children, the activities of the 'Holy Ghost' were invented. Hence we see why the shadowy figure of the 'Holy Ghost' had of necessity to appear in the Christian mythology*.

The final step was to answer the question: why had the god allowed its offspring to be crucified? This was easy: in order to provide an example of extreme moral virtue, thereby pointing the way towards a complete Jewish atonement. The actual conduct of Jesus himself had indeed made this answer seem plausible; and to add further strength it was claimed that Jesus had not really died after all; it was said that he had risen again from the dead; an idea already familiar to the Jews in the notion of the transfiguration of Isaiah. To add credence to this assertion, the testimonies of a number of simple people were obtained to the effect that they had actually seen Jesus so resurrected.

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*Virgin birth was not original to Christianity. The same notion had already been used in earlier mythologies.

To this point, Christianity was merely the instrument of a sect seeking power within the Jewish Church. There was, however, no finally successful outcome to these political aims, for the reason that the Jewish Church was splitting apart under the strain of perpetual bickering. The Christian leaders accordingly came to aim at spreading their influence abroad: when their policy had no ultimate success at home, the natural step was to seek to impose themselves on the Gentiles, and this inevitably led them westward, to Rome.

In the early days of this venture the proselytes had but meagre success: the underlying ethic of Jesus himself was just sufficient to keep the movement alive, but it gained no appreciable momentum. The reason for the initial failure was simply that the Christian mythology had been invented for Jewish, not Gentile, consumption. The Gentiles were not in the least interested in Jewish atonement, the linch-pin of the original doctrines.

Thus the Christian religion could not function effectively in the new environment without a substantial accretion to its mystic qualities. The required accretion eventually came, not from Hebrew sources, but through beliefs that had survived from the mortuary society of ancient Egypt. We have seen that the Egyptians invented the concepts of heaven and hell; and that they believed that a man might buy himself a passport to heaven for an appropriate consideration. Now why not replace the notion of a monetary purchase of the passport by a moral purchase? Why not replace the atonement of the Jewish people by the atonement—the salvation—of the individual? Why not assert that the Christian faith is the required moral passport to universal salvation? This was the step that gave new life to Christianity. Here at last was a mystic belief that appealed even to the Gentiles.

As an aside, we may notice that the Egyptian accretion explains a number of superficially puzzling features of the Christian religion. The shifting of emphasis from the atonement of the whole Jewish people to the salvation of the individual tended to make certain points in the original doctrines both superfluous and unintelligible. These factors were not written out of the Christian mythology, presumably because to do so would have endangered some other essential feature: the safest procedure was to leave the Jewish foundations intact and to add the Egyptian contribution as a superstructure. It is therefore not surprising that the theologians of the modern era have found it difficult to interpret Christianity as a coherent whole. Not only this, but the lack of a single clear-cut creed has brought about repeated cleavages within the Christian Church. The differences in belief and practice between the Roman Catholic and the Protestant gives an interesting case in point. To understand these differences we need only notice that, short of a complete reorientation of the Gospels, the simplest way of superimposing Egyptian concepts on Hebrew concepts was to leave the original Gospels more or less intact as representing the Hebrew contribution, and to add the Egyptian contribution through verbal dogma and ritual. Thus since Roman Catholicism functions mainly through dogma we find that Catholic beliefs have a bias to the Egyptian side; and since Protestantism is mainly based on the Gospels we find that Protestant beliefs have a bias to the Hebrew side. Now, we have seen that the Hebrew side alone was ineffective in its appeal to non-Jews, and this no doubt accounts for the general collapse of Protestantism in recent times. In contrast, Catholicism, with the Egyptian contribution strongly behind it, seems to be in no danger of disintegration, in spite of the heavy pressure that science is now exerting on all forms of religion.

One further remark before we return to the main theme. It is particularly noteworthy that while so much is said in the later Christian faith about the salvation of the individual, extremely little is forthcoming about what the 'saved' may expect to experience when they enter 'the kingdom of heaven'—reference to 'eternal bliss' scarcely seems to come within the range of meaningful concepts. The answer to this apparent paradox is, of course, that the subtle Jewish inventors of the

Christian religion were not at all concerned with what the individual would or would not experience when he entered 'the kingdom of heaven'; their concern was with the ultimate triumph of the Jewish people. Attempts to deal with the matter by later authors did not attain an intellectual level at all comparable with that of the early writers: the later chapters of the New Testament are of lower quality than the Gospels.

It is high time, however, that we returned to the Roman attitude to Christianity. In its new form, with the Egyptian concepts mixed in, Christianity had a strong appeal to the Roman leaders. In the first place, the Christian ethic fostered the pacific spirit, and therefore tended to preserve both the peace and the authority of the ruling class. Secondly, a poor man could be told that his lot on Earth was quite unimportant; that his ultimate reward 'lay in heaven'. Hence the Christian religion was an instrument with a great potentiality for confirming the power of the Roman aristocracy. But this was not the end of the matter. The pacific spirit had unacceptable military implications: an army cannot fight effectively on the 'turn the other cheek' precept; nor can a soldier find much comfort in the saying 'those that live by the sword shall die by the sword'. Hence to the Romans there was an inherent contradiction within the Christian philosophy*. In the result, Christianity was forced to mark time for about two centuries; the social implications prevented it from dying out altogether, and the military implications prevented it from becoming officially recognised. As time went on, however, the Roman feudal development grew in importance and Rome itself declined in military strength. Ultimately the preservation of the social order became the dominant motive and the balance swung in favour of Christianity. The Roman Church was formed, and it was through this, not through the Hebrew and

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*These remarks form an estimate of psychological forces, not of the conscious thoughts of particular individuals. The contradiction referred to in the text would tend to show itself, in the individual, as a confused mental state with little semblance to rationality.

Egyptian origins, that the Christian faith became at last a major religion.

The Rise of Modern Civilisation

When, about 400 A.D., the Roman political system was overthrown by barbarian assaults there was one group of Roman leaders that did not go down in the general collapse. To the Christian Church it was just as advantageous to gain ascendancy over the new barbarian rulers as it was to have held an important position in the old Roman Empire. Hence we find the barbarians being Christianised by missionaries from Rome. The psychological force that the missionaries brought to bear is readily intelligible. Instead of each conqueror being faced with the difficult problem of deifying himself, as had formerly been necessary, the Roman Church was now available to confirm the conqueror's authority, not by declaring him an offspring of a god, but as the leader chosen by a god. In return for this service the Christian faith was readily embraced and the Roman Church was accepted as its authority.

Now the barbarians did not overwhelm the conquered Roman territories with enormous new populations: the Saxon invasion probably altered the total population of Britain by only some ten or twenty per cent. The main effect of the barbarian conquests was to replace the old privileged class by the barbarians themselves. Thus the feudal system tended to persist with the new barbarian rulers Christianised by the Roman Church.

Had the barbarian attacks occurred all at once and then come to an end, civilisation would soon have got under way again; but the history of the next few centuries is of wave after wave of barbarians pouring from the east into Christianised feudal territory; when one set of barbarians had tasted the soft living of civilisation it was no longer in their nature to stand firm against the next group of invaders. The process of repeated invasion might have gone on until all traces of the

Roman civilisation were lost if there had not been an important advance of civilised military technique. The discovery of a form of armour suitable for Iron Age fighting gave civilised leaders so great an advantage that it eventually became possible for civilisation to maintain an adequate defence against the external disruptive influences. With this the so-called Dark Age came to an end.

The succeeding Mediæval Age was characterised by a highly stable social system. The invention of armour had further emphasised the dominance of the wealthy, thereby tending to preserve the feudal foundations of society. Stability was also maintained by the widespread acceptance of the Christian doctrine. Feudal leaders sought to enhance their position by adherence to the Christian Church, which thus became the most powerful political force of the age. Indeed the political aspects of the Church's relation with the feudal leaders were already apparent long before the beginning of the Mediæval Age. The Saxons in Britain, for example, confirmed their position of leadership by accepting a wider measure of Roman control than the Celtic-speaking population was willing to do. It was through this that Saxon became the official language, and hence that the British Isles became dominantly English-speaking. It is conceivable that but for Shakespeare we should now be having a Celtic revival movement in England.

The chief importance of feudalism lay in the inefficiency of its methods, which were such as to provide a degree of plenty for the leaders, but which were not by any means capable of supporting the maximum number of people that might have been supported if efficient methods had been used. When the feudal system ultimately broke down and better methods were introduced, expansion was immediately possible: it was on this expansion that our modern civilisation was founded.

Now why did feudalism collapse? Largely from an unexpected development in the Christian religion. We have seen how Christianity became a major religion because it apparently served to confirm the dominance of the privileged classes. The poor man was told that he should not worry about a few years of misery on Earth; that his reward was in heaven; and that we are all equal in the sight of our father in heaven. This theme was played so much during the Mediæval Age that an implicit faith in an after-life was implanted, an after-life in which we are all to be equal. But if we are all to be equal in heaven, why should we not be equal on Earth? It had taken a long time for this question to be asked, but once it was asked in earnest the outcome was indeed far-reaching: the feudal system was smashed by it, modern civilisation was developed on democratic lines through it, the lot of the average man was steadily improved from it, social revolutions were born through it, the Socialist doctrine owes its origin to it, and the Christian Church itself was almost mortally wounded by it. It is ironic that, after more than a thousand years of the systematic exploitation of the earnest endeavours of Jesus, there should have been such a violent back-fire on the exploiters themselves. By an extremely tortuous path something of the feeling for humanity shown by Jesus himself broke through into the general consciousness.

Now the feudal system, although it thus developed a serious instability, could not collapse at a moment's notice. The collapse had to wait until a physical means for overcoming the power of the wealthy became available. So long as the mediæval castle and the armoured knight could not be assailed by the common man, the system remained secure. But the invention of gunpowder in the 14th century ended the dominance of the castle. Gunpowder would also have ended the reign of the armed knight, had this not come about at the same time in a most remarkable way. The feats of the English longbowmen are well known. The longbow made heavy armour not only useless but a death-trap. What, it may be asked, was particularly noteworthy in this? Well, in the first place, the bow and arrow was not a new invention: it goes back to Magdalenian times. Take this in conjunction with the following sequence of events: for three civilised millennia the armour of the Bronze Age knight won him invincibility against the infantryman. Then iron swords and spears spelt the end of Bronze Age armour, and led to the days of barbarian dominance in hand-to-hand combat. The barbarian dominance was ultimately checked by iron armour, which gave to the mediæval knight the same advantages that the bronze knight had enjoyed in an earlier age. Yet through all this time, encompassing a span of more than 5,000 years, the potentialities of the bow and arrow remained undeveloped until the advent of the longbowmen. Surely this must be reckoned a major example of lack of inventiveness. That this was not an isolated example is also shown by the following case. Horses were used in the ancient civilisations mainly for purposes of war, oxen being used for tillage. Now, so feeble was the military intelligence that, when horses were coupled to a chariot, the ox-yoke was employed, thereby half choking the beasts and rendering them much less efficient than they would have been with a properly designed harness. The invention of harness had to wait until the ninth century A.D., when indeed the horse was becoming widely used for utilitarian purposes. The modern harness for draft horses, the shoulder-collar and nailed shoes, were invented in the tenth century.

The emergence of the new religious concept of the equality of man was further assisted by physical circumstances. With the low feudal population, human labour was never common and was in fact sometimes scarce. The effect of a plague, for example, would produce a temporary lowering of population and hence would stimulate a demand for human labour. Besides tending to emphasise the importance of the individual, such scarcities prompted a search for mechanical methods of replacing human muscle power. Thus the mediæval world was machine-conscious in a way that the slave civilisations of the ancient world had never been. The windmill, the mechanical saw, the forge with tilt hammer were invented in the twelfth century, along with the wheel-barrow, window glass, domestic chimney, candles and paved roads. Spectacles, the wheeled plough with mould board, and the ship's rudder came in the thirteenth century; lock gates on the Dutch canals and other advances of practical hydraulics, gunpowder, and the grandfather clock came in the fourteenth century. Printing was the outstanding contribution of the fifteenth century.

Alongside these practical developments, progress was also being made in abstract thought. During the Dark Age the ancient knowledge had in a large measure been preserved by the Church; and what had been lost was quickly refound or rediscovered. More particularly, the problem of the dynamics of moving bodies began to attract serious attention in the fourteenth century. The decision of the new science to choose dynamics as its starting point was propitious. The precise data obtained from the flight of cannon-balls when added to astronomical knowledge provided a body of information superior to that available to the ancient world. It was on this data that new investigations were based. The work culminated in the discoveries of Newton, which not only solved the general problem of dynamics, thereby taking man's intellectual achievement one clear step beyond that of Archimedes and his contemporaries, but it supplied the pattern for all subsequent scientific developments. From then onwards, instead of stumbling in a maze, science had a path to follow.

In spite of the great Newtonian triumph, the junction between practice and intellect, the junction that was so sadly lacking in the ancient world, did not come mainly from the intellectual side. The intellectual was still disinclined to reach downward—as he saw it—to the craftsman. Once again the opportunity might have slipped by, had it not been for the changed outlook of the craftsman. The craftsman was no longer a slave to be ordered around at his master's pleasure. The craftsman emerged from the Middle Ages with a newfound respect in himself. He was ambitious, and he had confidence—are we not all equal in the sight of God? He formed guilds to promote skill in his craft and to preserve himself from exploitation. Above all, he was able to reach out to the intellectual discoveries of the new science, which were now readily available to him through the invention of printing. At first in a vague form, and then increasingly with more precision, the craftsman began to pick up the elements of the new science. The outcome of the long-delayed union of theory and practice came in the 18th century with the spate of mechanical discoveries that made way for the industrial development that has since become the outstanding characteristic of modern civilisation. This social explosion, it may be noted, required more than three centuries of development for its beginning, and four centuries before it began to yield really important results; which may be contrasted with the single century vouchsafed to the Greeks in the Hellenistic period.

That society did not run into the disintegrative phase of the civilisation cycle long before the end of four centuries we owe to the great amount of slack that was created in feudal times: it was due to the population then falling so low that four centuries of expansion were permitted to us. Industrialism has further added enormously to human resources, both directly and by enabling the resources of the Americas to be developed. The recent rise of populations, already noted in the previous chapter, was made possible by this further addition to human resources.

The Future

It is now time to relate the whole of our discussion back to the opening remarks of the present chapter. We said that history provides a test of the validity of the general ideas of earlier chapters. Now that we have seen the test in operation we can ask: how do the earlier ideas measure up? No doubt there will be dissentient views, but it seems to me personally that the evidence in favour of the dominant rôle played by the relationship of resources to population is strong: I do not think it would be an exaggeration to say that the evidence is overwhelmingly strong. This being so, it is possible to proceed to a final step in the manner that is customary in science.

In science when a theory has been worked out on the basis of present and past experience the ultimate test—the acid test—is brought to bear by using the theory to *predict* the future. If the predictions turn out to be correct the theory stands. If the predictions turn out to be wrong the theory falls. In the last reckoning there is no other thoroughly reliable way of assessing any process of conceptual reasoning. Our ultimate concern must therefore be with an attempt to predict the fate of man. Whether our predictions prove correct or not only the future itself can decide.

Of the factors discussed above perhaps the most broadly significant was the civilisation cycle. The civilisation cycle appears to be of such wide applicability that valid predictions can very probably be based on it. Why, we may ask, should our modern civilisation escape the disintegrative phase that in the past has always followed from an overstrained economy? Modern civilisation represents an expansive phase based on the slack created first by the Romans and then, through the Dark and Mediæval Ages, by the feudal system. To this slack has been added the recent extension of resources produced by industrialism and by expansion into America. Some of this latter resource, in Canada and South America, still remains; but, by and large, little further scope is now left. Some people conveniently assume that new resources will automatically become available when required—'necessity is the mother of invention'. 'The mother of invention' did not save the civilisations of the ancient world, however, and there is no reason why she should save us. People nowadays find it difficult to conceive of a widespread collapse of modern civilisation because we have been taught to think in terms of a century as a long time. To the average student of history even the Mediæval Age seems remote; the Mediterranean civilisations seem almost to be back at the dawn of time; and the civilisations of the Old World have been altogether lost in the mists of antiquity. Recent history has been stretched out to inordinate lengths simply because much detail is known about it, not because it has been shown that recent times are more germane to an understanding of the organisation of society. Thus we have come to regard the expansive phase of modern civilisation, the phase that has occupied the last five centuries, as covering the really important part of man's history. Nothing could be more misleading than this point of view, since it means that we lose sight of the wider patterns; we lose sight of the disintegration that must follow inevitably when a population outstrips its resources. In the previous chapter we saw that modern civilisation has come perilously near this condition.

The disturbances of the last century or so should not be interpreted, however, as evidence of break-up. The wars of our civilisation have not been wars of social disintegration, but of the jockeying for advantage in the expanding phase, as men have always jockeyed for an unfair share of new resources. Modern civilisation has not yet seen the far grimmer wars of disintegration. But the stage is rapidly being set for them. We can hardly avoid the comparison between our present civilisation and the civilisation of the Old World in 1000 B.C. Just as then, we now have a number of interlocking rival communities. Our population has risen to such an extent that we are on the verge of the same cataclysmic break-up. Just as the discovery of iron-smelting led to the ruin of the Old World, so the discovery of the atomic bomb has paved the way for the collapse of modern civilisation.

If mankind wishes to avoid such a disaster two possibilities remain. One is the method used successfully by the Romans, the method of unfair shares. The other is a method never yet employed by civilised man, but which is known to have been successfully practised by primitive tribes: namely, the method of population control. The suggestions of the last chapter were in effect a combination of both of these. It has been pointed out that complete fair shares throughout the world must lead to technical disaster, to the loss of industrial resources; and it was therefore suggested that the industrialised nations should employ their advantage in further developments designed to give a general raising of the world-wide standard of living. At the same time it was stressed that this can be a solution only if industrialised and non-industrialised countries alike undertake the job of immediately stabilising their populations. This is neither a monstrous nor a difficult remedy; indeed it has already been achieved without any consequent disadvantage in a number of European countries. The future will show whether mankind as a whole can display the degree of intelligence that is needed to adopt population control as a world-wide policy. Should we not do so, the downward slump of the civilisation cycle remains inevitably in wait for us.

To those who imagine that, even if a downward slide were to occur, there would necessarily be a further rise of some new civilisation, let it be said that such a rise would no doubt be possible after a recuperative process, but the rise would tend to be hampered by a lack of raw materials. The exhaustion of the higher grades of metallic ores has made it more difficult for a future civilisation to develop out of chaos, and each further repetition of the civilisation cycle can only make it more difficult still.

These considerations provide us with a grave warning. We see that an uncontrolled evolution of human society leading to further rises and falls of civilisation is most unlikely to give a further expansion of resources. The indications are the other way round: if evolution remains blind, human resources from now on are more likely to decrease than to increase. It is not inconceivable that we stand today on the highest point that our species will ever attain. It is not impossible that in two thousand years the whole of mankind may be returned to a barbaric state. It is not impossible that within twenty thousand years man may be extinct. This is not alarmist nonsense. The other great apes are even now in serious decline. There are indeed biological indications that the mammals as a whole are already past their zenith.

But this fate, which hangs so clearly over us, is by no means inevitable. It is only likely to come about if we continue living with our heads in metaphorical brown paper bags, if we continue to conduct our affairs in an atmosphere compounded of indifference, hysteria, and primitive superstition. Should man give his brain over to a serious study of human relations, as he now studies the arts and sciences, there is no reason why the threat to his dominance on the Earth should not be met with entire success.

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